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FIFTH ANNUAL REPORT

OF THE

METROPOLITAN DISTRICT COMMISSION

1924

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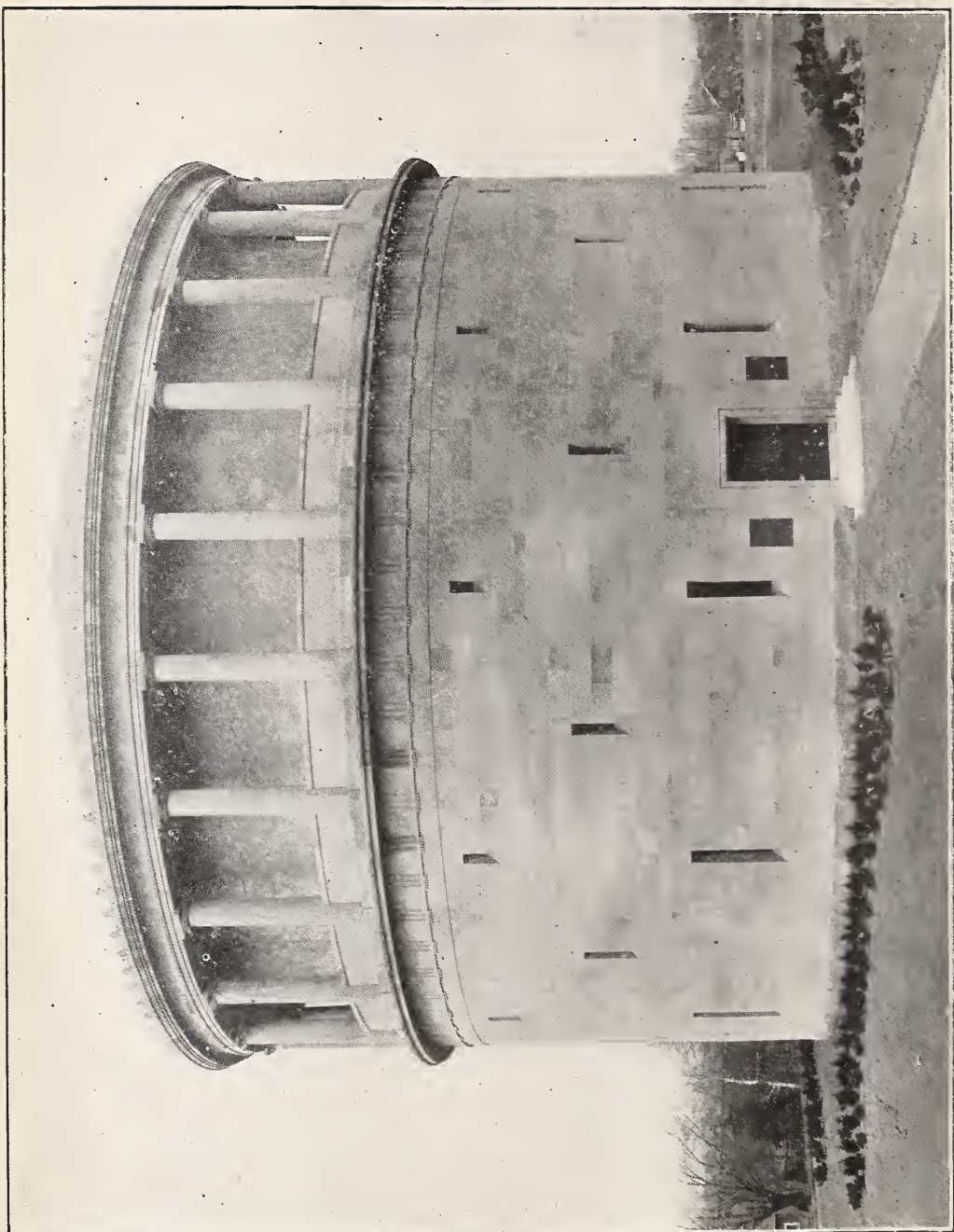




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ARLINGTON RESERVOIR

C O N T E N T S

	PAGE
I. Organization and Administration	1
Commission, Officers and Employees	1
II. General Financial Statement	1
III. Construction	1
IV. Charles River Bridges	3
V. Rainfall and Consumption of Water	3
VI. Special Investigations	3
VII. Other reports	4
Report of the Director of Parks	4
Report of the Director and Chief Engineer of Park Engineering	9
Parkways	9
Reservations	11
Bridges and Locks	12
General	13
Report of Director and Chief Engineer of Water Division	13
Organization	13
Metropolitan Water District and Works	13
Construction	14
Pumping Equipment, Southern High Service	14
Arlington Reservoir	14
Pumping Equipment, Northern High Service	14
Weston Aqueduct Supply Mains	14
Maintenance	15
Precipitation and Yield of Watersheds	15
Storage Reservoirs	15
Wachusett Reservoir	16
Sudbury Reservoir	17
Framingham Reservoir No. 3	17
Framingham Reservoirs Nos. 1 and 2, Ashland, Hopkinton and Whitehall Reservoirs	17
Farm Pond	18
Lake Cochituate	18
Aqueducts	19
Wachusett Aqueduct	19
Sudbury Aqueduct	19
Weston Aqueduct	19
Cochituate Aqueduct	20
Protection of Water Supply	20
Clinton Sewage Disposal Works	21
Forestry	21
Hydro-electric Service	22
Wachusett Service	22
Sudbury Service	23
Distribution Pumping Stations	23
Distribution Reservoirs	24
Distribution Buildings and Grounds	26
Distribution Pipe Lines	26
Consumption of Water	27
Installation of Meters on Service Pipes	28
Water supplied Outside of Metropolitan Water District	30
Filtration of Water	30
Report of Director and Chief Engineer of Sewerage Division	30
Organization	30
Metropolitan Sewerage Districts	31
Areas and Populations	31
Metropolitan Sewers	32
Sewers purchased and constructed and their Connections	32
Construction	35
North Metropolitan Sewerage System	35
New Mystic Sewer	35

Report of Director and Chief Engineer of Sewerage Division — *Concluded.*

Mill Brook Valley Sewer, Arlington	35
Maintenance	36
Scope of Work and Force employed	36
Deer Island Pumping Station	36
East Boston Pumping Station	36
Charlestown Pumping Station	36
Winchester Stock Yard	37
Ward Street Pumping Station	37
Nut Island Screen-house	38
Gasolene in Public Sewers	38
Data relating to Areas and Populations contributing Sewage to	
Metropolitan Sewerage System	39
North Metropolitan System	39
South Metropolitan System	40
Whole Metropolitan System	41
Pumping Stations	42
Capacities and Results	42
North Metropolitan System	42
South Metropolitan System	43
Metropolitan Sewerage Outfalls	44
Material intercepted at the Screens	44
Financial Statement, Parks Division	44
Loan Funds	44
Maintenance Expenditures	45
Metropolitan Parks Expense Fund	46
Financial Statement, Water and Sewer Divisions	46
Water Works — Construction	46
(1) Water Loans, Receipts and Payments	46
(2) Total Water Debt, December 31, 1924	46
(3) Metropolitan Water Loan and Sinking Fund, December 31, 1924	47
(4) Water Assessment, 1924	47
(5) Supplying Water to Cities and Towns outside of District and to	
Water Companies	48
(6) Expenditures for the Different Works	49
(7) Detailed Financial Statement under Metropolitan Water Act	50
(a) Expenditures and Disbursements	50
(b) Receipts	53
(c) Assets	54
(d) Liabilities	54
Sewerage Works	55
(1) Metropolitan Sewerage Loans, Receipts and Payments	55
North Metropolitan System	55
South Metropolitan System	55
(2) Total Sewerage Debt, December 31, 1924	56
North Metropolitan System	56
South Metropolitan System	56
(3) North and South Metropolitan Loan and Sinking Funds, December	
31, 1924	57
(4) Sewer Assessments, 1924	57
(5) Expenditures for the Different Works	58
(6) Detailed Financial Statement	59
(a) Expenditures and Disbursements	59
(b) Receipts	62
(c) Assets	63
(d) Liabilities	63
Appendix No. 1. — Contracts relating to the Metropolitan Water Works made	
and pending during the Year 1924	64
Appendix No. 2. — Tables relating to the Maintenance of the Metropolitan	
Water Works	69

Appendix No. 2 — *Concluded.*

PAGE

Table No. 1. — Monthly Rainfall in Inches at Various Places on the Metropolitan Water Works in 1924	69
Table No. 2. — Rainfall in Inches at Chestnut Hill Reservoir in 1924	70
Table No. 3. — Wachusett System. — Statistics of Flow of Water, Storage and Rainfall in 1924	71
Table No. 4. — Sudbury System. — Statistics of Flow of Water, Storage and Rainfall in 1924	72
Table No. 5. — Cochituate System. — Statistics of Flow of Water, Storage and Rainfall in 1924	73
Table No. 6. — Sources from which and Periods during Which Water has been drawn for the Supply of the Metropolitan Water District	74
Table No. 7. — Average Daily Quantity of Water flowing through Aqueducts in 1924 by Months	75
Table No. 8. — (Meter Basis) Average Daily Consumption of Water by Districts in Cities and Towns supplied by the Metropolitan Water Works in 1924	76
Table No. 9. — (Meter Basis) Average Daily Consumption of Water in Cities and Towns supplied by Metropolitan Water Works in 1924	77
Table No. 10. — Chemical Examinations of Water from the Wachusett Reservoir, Clinton	80
Table No. 11. — Chemical Examinations of Water from the Sudbury Reservoir	81
Table No. 12. — Chemical Examinations of Water from Spot Pond, Stoneham	81
Table No. 13. — Chemical Examinations of Water from Lake Cochituate	82
Table No. 14. — Chemical Examinations of Water from a Tap at the State House, Boston.	82
Table No. 15. — Chemical Examinations of Water from a Faucet in Boston, 1898-1924	83
Table No. 16. — Number of Bacteria per Cubic Centimeter in Water from Various Parts of the Metropolitan Water Works, 1898-1924	83
Table No. 17. — Colors of Water from Various Parts of the Metropolitan Water Works in 1924	84
Table No. 18. — Temperatures of Water from Various Parts of the Metropolitan Water Works in 1924	85
Table No. 19. — Length of Metropolitan Water Works Main Lines and Connections and Number of Valves set in Same, December 31, 1924	86
Table No. 20. — Length of Metropolitan Water Works Hydrant, Blow-off and Drain Pipes, December 31, 1924	86
Table No. 21. — Length of Metropolitan Water Works Main Lines and Connections and Water Pipes Four Inches in Diameter and Larger in the Several Cities and Towns supplied by the Metropolitan Water Works, December 31, 1924	87
Table No. 22. — Number of Service Pipes, Meters, Per Cent of Services metered, Fire Services, and Fire Hydrants in the Several Cities and Towns supplied by the Metropolitan Water Works, December 31, 1924	88
Table No. 23. — Elevation of the Hydraulic Grade Line in Feet above Boston City Base for each Month at Stations on the Metropolitan Water Works during 1924	89
Appendix No. 3. — Contracts made and pending during the year 1924 — Sewerage Division	92
Appendix No. 4. — Financial Statement presented to the General Court on January 15, 1925	94

C O N T E N T S

	PAGE
I. Organization and Administration	1
Commission, Officers and Employees	1
II. General Financial Statement	1
III. Construction	1
IV. Charles River Bridges	3
V. Rainfall and Consumption of Water	3
VI. Special Investigations	3
VII. Other reports	4
Report of the Director of Parks	4
Report of the Director and Chief Engineer of Park Engineering	9
Parkways	9
Reservations	11
Bridges and Locks	12
General	13
Report of Director and Chief Engineer of Water Division	13
Organization	13
Metropolitan Water District and Works	13
Construction	14
Pumping Equipment, Southern High Service	14
Arlington Reservoir	14
Pumping Equipment, Northern High Service	14
Weston Aqueduct Supply Mains	14
Maintenance	15
Precipitation and Yield of Watersheds	15
Storage Reservoirs	15
Wachusett Reservoir	16
Sudbury Reservoir	17
Framingham Reservoir No. 3	17
Framingham Reservoirs Nos. 1 and 2, Ashland, Hopkinton and Whitehall Reservoirs	17
Farm Pond	18
Lake Cochituate	18
Aqueducts	19
Wachusett Aqueduct	19
Sudbury Aqueduct	19
Weston Aqueduct	19
Cochituate Aqueduct	20
Protection of Water Supply	20
Clinton Sewage Disposal Works	21
Forestry	21
Hydro-electric Service	22
Wachusett Service	22
Sudbury Service	23
Distribution Pumping Stations	23
Distribution Reservoirs	24
Distribution Buildings and Grounds	26
Distribution Pipe Lines	26
Consumption of Water	27
Installation of Meters on Service Pipes	28
Water supplied Outside of Metropolitan Water District	30
Filtration of Water	30
Report of Director and Chief Engineer of Sewerage Division	30
Organization	30
Metropolitan Sewerage Districts	31
Areas and Populations	31
Metropolitan Sewers	32
Sewers purchased and constructed and their Connections	32
Construction	35
North Metropolitan Sewerage System	35
New Mystic Sewer	35

Report of Director and Chief Engineer of Sewerage Division — *Concluded.*

Mill Brook Valley Sewer, Arlington	35
Maintenance	36
Scope of Work and Force employed	36
Deer Island Pumping Station	36
East Boston Pumping Station	36
Charlestown Pumping Station	36
Winchester Stock Yard	37
Ward Street Pumping Station	37
Nut Island Screen-house	38
Gasolene in Public Sewers	38
Data relating to Areas and Populations contributing Sewage to	
Metropolitan Sewerage System	39
North Metropolitan System	39
South Metropolitan System	40
Whole Metropolitan System	41
Pumping Stations	42
Capacities and Results	42
North Metropolitan System	42
South Metropolitan System	43
Metropolitan Sewerage Outfalls	44
Material intercepted at the Screens	44
Financial Statement, Parks Division	44
Loan Funds	44
Maintenance Expenditures	45
Metropolitan Parks Expense Fund	46
Financial Statement, Water and Sewer Divisions	46
Water Works — Construction	46
(1) Water Loans, Receipts and Payments	46
(2) Total Water Debt, December 31, 1924	46
(3) Metropolitan Water Loan and Sinking Fund, December 31, 1924	47
(4) Water Assessment, 1924	47
(5) Supplying Water to Cities and Towns outside of District and to	
Water Companies	48
(6) Expenditures for the Different Works	49
(7) Detailed Financial Statement under Metropolitan Water Act	50
(a) Expenditures and Disbursements	50
(b) Receipts	53
(c) Assets	54
(d) Liabilities	54
Sewerage Works	55
(1) Metropolitan Sewerage Loans, Receipts and Payments	55
North Metropolitan System	55
South Metropolitan System	55
(2) Total Sewerage Debt, December 31, 1924	56
North Metropolitan System	56
South Metropolitan System	56
(3) North and South Metropolitan Loan and Sinking Funds, December	
31, 1924	57
(4) Sewer Assessments, 1924	57
(5) Expenditures for the Different Works	58
(6) Detailed Financial Statement	59
(a) Expenditures and Disbursements	59
(b) Receipts	62
(c) Assets	63
(d) Liabilities	63
Appendix No. 1. — Contracts relating to the Metropolitan Water Works made	
and pending during the Year 1924	64
Appendix No. 2. — Tables relating to the Maintenance of the Metropolitan	
Water Works	69

Appendix No. 2 — *Concluded.*

PAGE

Table No. 1. — Monthly Rainfall in Inches at Various Places on the Metropolitan Water Works in 1924	69
Table No. 2. — Rainfall in Inches at Chestnut Hill Reservoir in 1924	70
Table No. 3. — Wachusett System. — Statistics of Flow of Water, Storage and Rainfall in 1924	71
Table No. 4. — Sudbury System. — Statistics of Flow of Water, Storage and Rainfall in 1924	72
Table No. 5. — Cochituate System. — Statistics of Flow of Water, Storage and Rainfall in 1924	73
Table No. 6. — Sources from which and Periods during Which Water has been drawn for the Supply of the Metropolitan Water District	74
Table No. 7. — Average Daily Quantity of Water flowing through Aqueducts in 1924 by Months	75
Table No. 8. — (Meter Basis) Average Daily Consumption of Water by Districts in Cities and Towns supplied by the Metropolitan Water Works in 1924	76
Table No. 9. — (Meter Basis) Average Daily Consumption of Water in Cities and Towns supplied by Metropolitan Water Works in 1924	77
Table No. 10. — Chemical Examinations of Water from the Wachusett Reservoir, Clinton	80
Table No. 11. — Chemical Examinations of Water from the Sudbury Reservoir	81
Table No. 12. — Chemical Examinations of Water from Spot Pond, Stoneham	81
Table No. 13. — Chemical Examinations of Water from Lake Cochituate	82
Table No. 14. — Chemical Examinations of Water from a Tap at the State House, Boston.	82
Table No. 15. — Chemical Examinations of Water from a Faucet in Boston, 1898-1924	83
Table No. 16. — Number of Bacteria per Cubic Centimeter in Water from Various Parts of the Metropolitan Water Works, 1898-1924	83
Table No. 17. — Colors of Water from Various Parts of the Metropolitan Water Works in 1924	84
Table No. 18. — Temperatures of Water from Various Parts of the Metropolitan Water Works in 1924	85
Table No. 19. — Length of Metropolitan Water Works Main Lines and Connections and Number of Valves set in Same, December 31, 1924	86
Table No. 20. — Length of Metropolitan Water Works Hydrant, Blow-off and Drain Pipes, December 31, 1924	86
Table No. 21. — Length of Metropolitan Water Works Main Lines and Connections and Water Pipes Four Inches in Diameter and Larger in the Several Cities and Towns supplied by the Metropolitan Water Works, December 31, 1924	87
Table No. 22. — Number of Service Pipes, Meters, Per Cent of Services metered, Fire Services, and Fire Hydrants in the Several Cities and Towns supplied by the Metropolitan Water Works, December 31, 1924	88
Table No. 23. — Elevation of the Hydraulic Grade Line in Feet above Boston City Base for each Month at Stations on the Metropolitan Water Works during 1924	89
Appendix No. 3. — Contracts made and pending during the year 1924 — Sewerage Division	92
Appendix No. 4. — Financial Statement presented to the General Court on January 15, 1925	94

CONTENTS

	PAGE
I. Organization and Administration	1
Commission, Officers and Employees	1
II. General Financial Statement	1
III. Construction	1
IV. Charles River Bridges	3
V. Rainfall and Consumption of Water	3
VI. Special Investigations	3
VII. Other reports	4
Report of the Director of Parks	4
Report of the Director and Chief Engineer of Park Engineering	9
Parkways	9
Reservations	11
Bridges and Locks	12
General	13
Report of Director and Chief Engineer of Water Division	13
Organization	13
Metropolitan Water District and Works	13
Construction	14
Pumping Equipment, Southern High Service	14
Arlington Reservoir	14
Pumping Equipment, Northern High Service	14
Weston Aqueduct Supply Mains	14
Maintenance	15
Precipitation and Yield of Watersheds	15
Storage Reservoirs	15
Wachusett Reservoir	16
Sudbury Reservoir	17
Framingham Reservoir No. 3	17
Framingham Reservoirs Nos. 1 and 2, Ashland, Hopkinton and Whitehall Reservoirs	17
Farm Pond	18
Lake Cochituate	18
Aqueducts	19
Wachusett Aqueduct	19
Sudbury Aqueduct	19
Weston Aqueduct	19
Cochituate Aqueduct	20
Protection of Water Supply	20
Clinton Sewage Disposal Works	21
Forestry	21
Hydro-electric Service	22
Wachusett Service	22
Sudbury Service	23
Distribution Pumping Stations	23
Distribution Reservoirs	24
Distribution Buildings and Grounds	26
Distribution Pipe Lines	26
Consumption of Water	27
Installation of Meters on Service Pipes	28
Water supplied Outside of Metropolitan Water District	30
Filtration of Water	30
Report of Director and Chief Engineer of Sewerage Division	30
Organization	30
Metropolitan Sewerage Districts	31
Areas and Populations	31
Metropolitan Sewers	32
Sewers purchased and constructed and their Connections	32
Construction	35
North Metropolitan Sewerage System	35
New Mystic Sewer	35

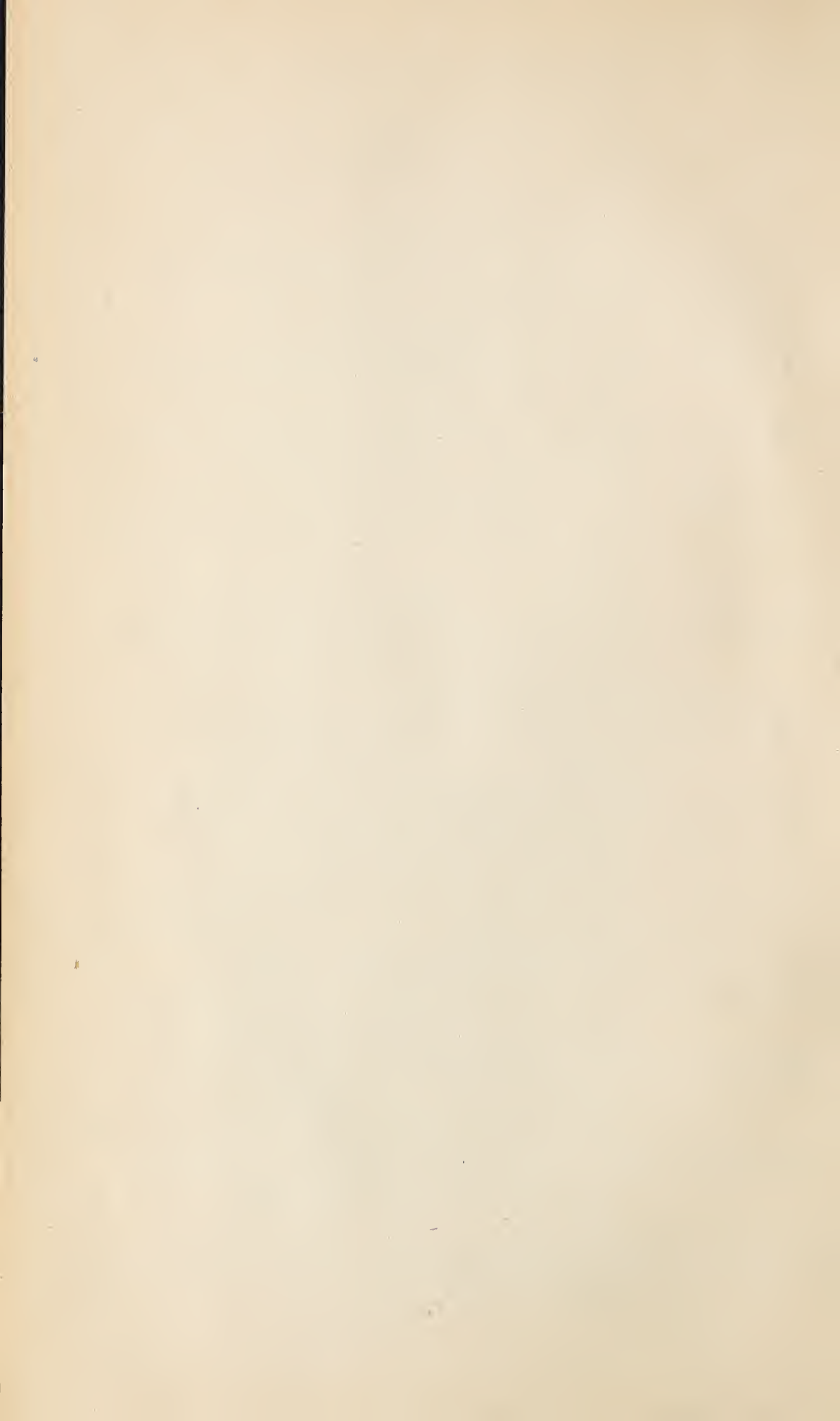
Report of Director and Chief Engineer of Sewerage Division — *Concluded.*

Mill Brook Valley Sewer, Arlington	35
Maintenance	36
Scope of Work and Force employed	36
Deer Island Pumping Station	36
East Boston Pumping Station	36
Charlestown Pumping Station	36
Winchester Stock Yard	37
Ward Street Pumping Station	37
Nut Island Screen-house	38
Gasolene in Public Sewers	38
Data relating to Areas and Populations contributing Sewage to	
Metropolitan Sewerage System	39
North Metropolitan System	39
South Metropolitan System	40
Whole Metropolitan System	41
Pumping Stations	42
Capacities and Results	42
North Metropolitan System	42
South Metropolitan System	43
Metropolitan Sewerage Outfalls	44
Material intercepted at the Screens	44
Financial Statement, Parks Division	44
Loan Funds	44
Maintenance Expenditures	45
Metropolitan Parks Expense Fund	46
Financial Statement, Water and Sewer Divisions	46
Water Works — Construction	46
(1) Water Loans, Receipts and Payments	46
(2) Total Water Debt, December 31, 1924	46
(3) Metropolitan Water Loan and Sinking Fund, December 31, 1924	47
(4) Water Assessment, 1924	47
(5) Supplying Water to Cities and Towns outside of District and to Water Companies	48
(6) Expenditures for the Different Works	49
(7) Detailed Financial Statement under Metropolitan Water Act	50
(a) Expenditures and Disbursements	50
(b) Receipts	53
(c) Assets	54
(d) Liabilities	54
Sewerage Works	55
(1) Metropolitan Sewerage Loans, Receipts and Payments	55
North Metropolitan System	55
South Metropolitan System	55
(2) Total Sewerage Debt, December 31, 1924	56
North Metropolitan System	56
South Metropolitan System	56
(3) North and South Metropolitan Loan and Sinking Funds, December 31, 1924	57
(4) Sewer Assessments, 1924	57
(5) Expenditures for the Different Works	58
(6) Detailed Financial Statement	59
(a) Expenditures and Disbursements	59
(b) Receipts	62
(c) Assets	63
(d) Liabilities	63
Appendix No. 1. — Contracts relating to the Metropolitan Water Works made and pending during the Year 1924	64
Appendix No. 2. — Tables relating to the Maintenance of the Metropolitan Water Works	69

Appendix No. 2 — *Concluded.*

PAGE

Table No. 1. — Monthly Rainfall in Inches at Various Places on the Metropolitan Water Works in 1924	69
Table No. 2. — Rainfall in Inches at Chestnut Hill Reservoir in 1924	70
Table No. 3. — Wachusett System. — Statistics of Flow of Water, Storage and Rainfall in 1924	71
Table No. 4. — Sudbury System. — Statistics of Flow of Water, Storage and Rainfall in 1924	72
Table No. 5. — Cochituate System. — Statistics of Flow of Water, Storage and Rainfall in 1924	73
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Table No. 11. — Chemical Examinations of Water from the Sudbury Reservoir	81
Table No. 12. — Chemical Examinations of Water from Spot Pond, Stoneham	81
Table No. 13. — Chemical Examinations of Water from Lake Cochituate	82
Table No. 14. — Chemical Examinations of Water from a Tap at the State House, Boston.	82
Table No. 15. — Chemical Examinations of Water from a Faucet in Boston, 1898-1924	83
Table No. 16. — Number of Bacteria per Cubic Centimeter in Water from Various Parts of the Metropolitan Water Works, 1898-1924	83
Table No. 17. — Colors of Water from Various Parts of the Metropolitan Water Works in 1924	84
Table No. 18. — Temperatures of Water from Various Parts of the Metropolitan Water Works in 1924	85
Table No. 19. — Length of Metropolitan Water Works Main Lines and Connections and Number of Valves set in Same, December 31, 1924	86
Table No. 20. — Length of Metropolitan Water Works Hydrant, Blow-off and Drain Pipes, December 31, 1924	86
Table No. 21. — Length of Metropolitan Water Works Main Lines and Connections and Water Pipes Four Inches in Diameter and Larger in the Several Cities and Towns supplied by the Metropolitan Water Works, December 31, 1924	87
Table No. 22. — Number of Service Pipes, Meters, Per Cent of Services metered, Fire Services, and Fire Hydrants in the Several Cities and Towns supplied by the Metropolitan Water Works, December 31, 1924	88
Table No. 23. — Elevation of the Hydraulic Grade Line in Feet above Boston City Base for each Month at Stations on the Metropolitan Water Works during 1924	89
Appendix No. 3. — Contracts made and pending during the year 1924 — Sewerage Division	92
Appendix No. 4. — Financial Statement presented to the General Court on January 15, 1925	94



REPORT OF THE METROPOLITAN DISTRICT COMMISSION

To the Honorable the Senate and House of Representatives of the Commonwealth of Massachusetts in General Court assembled

The Metropolitan District Commissioner has already presented to your Honorable Body an abstract of the account of the receipts, expenditures, disbursements and liabilities of the Metropolitan District Commission for the fiscal year ending on November 30, 1924, and now, in accordance with the provisions of Section 100 of Chapter 92 of the General Laws, presents a detailed statement of its doings for the calendar year ending on December 31, 1924.

FIFTH ANNUAL REPORT

I. ORGANIZATION AND ADMINISTRATION

COMMISSION, OFFICERS AND EMPLOYEES

James A. Bailey, sometime previous to the expiration of his term of office on November 30, 1924, presented his resignation which, however, was not accepted until after that date. He had with marked ability and with studious care for the interests of the Metropolitan District served for twenty years on various boards and commissions: as chairman of the Board of Metropolitan Sewerage Commissioners, April 1, 1900 to March 20, 1901, member of the Metropolitan Water and Sewerage Board, March 20, 1901 to March 20, 1913, member of the Metropolitan Water and Sewerage Board, March 20, 1918 to December 1, 1919, and after the consolidation in 1919 as Commissioner of the Metropolitan District Commission. Davis B. Keniston was appointed to fill the vacancy. The membership of the Commission, with this exception, remains the same as in the preceding year: Davis B. Keniston, Commissioner; Frank A. Bayrd, Frank G. Hall, William H. Squire and George B. Wason, Associate Commissioners. Frank G. Hall is Director of Parks, John R. Rablin, Director of Park Engineering, William E. Foss, Director of the Water Division and Frederick D. Smith, Director of the Sewerage Division.

George Lyman Rogers has continued as secretary and the following as chief engineers: of parks, John R. Rablin; of water, William E. Foss; of sewerage, Frederick D. Smith.

The maximum number of employees during the year was 1,590, divided as follows: general offices, 25; parks, 952; water, 383; sewerage, 230.

In this tabulation of employees the police are included under parks, although, they give considerable protection to portions of the water system.

II. GENERAL FINANCIAL STATEMENT

Year ending November 30, 1924

Expenditure for construction	\$2,286,000 56
Expenditure for maintenance	2,723,550 31
Total expenditure	5,009,550 87
Unexpended balance maintenance appropriations	221,907 68
Serial bonds issued	1,000,000 00
Serial bonds paid	218,243 75
Increase in sinking funds	2,134,839 95
Decrease in net debt	1,353,083 70

On November 30, 1924

Net debt	\$42,142,854 94
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III. CONSTRUCTION AND MAINTENANCE

The New Mystic Sewer in Winchester and Woburn was completed in August and an opening provided for the projected sewer in the Aberjona River Valley in Woburn.

Work on the first section of the Mill Brook Valley Sewer in Arlington and Medford was begun in July and about 1,500 feet have already been constructed. Plans and specifications for another section are nearly completed and work will be commenced early in the season.

Extended repairs have been made at the Deer Island, East Boston and Charlestown pumping stations and a new locker building has been constructed at the Winchester stock yard.

The new centrifugal pump and uniflow engine for the Ward Street Pumping Station has been put in place and the connections necessary for use are about completed.

The roof of the Nut Island Screen-house has been repaired and the yard at Prospect Street fenced.

Incidental additions of an air chamber, smoke flue, soot blower, feed pipes and blow-off drains and insulation coverings at Chestnut Hill Pumping Station No. 1 were completed April 1.

The masonry tower for the Arlington Reservoir has been completed and the grounds surrounding the reservoir graded and seeded.

The new engine at the Spot Pond Pumping Station has been installed and the connections are nearly completed.

Of the new Weston Aqueduct Supply Mains the connection from the terminal chamber at Weston to Charles River has been completed and of the main from Weston to Medford, one section 11,365 feet in length has been completed. About 9,000 feet of two other sections have been laid, leaving 20,000 feet partially constructed, and upon the last section, 7,000 feet in length, the preliminary work is finished. The entire main will be laid and connections made during the coming year.

In the Blue Hills Parkway 7,192 square feet of concrete sidewalk have been built.

The connecting link of Furnace Brook Parkway between Newport Avenue and Hancock Street, across the location of the New York, New Haven & Hartford Railroad, together with the new overpass railroad bridge, has been constructed and the parkway surfaced.

Plans and specifications have been prepared for building a half-tide dam in Black's Creek for bathing purposes and work will commence upon the contribution by the city of Quincy of its share of the cost.

In the Middlesex Fells the drainage system has been extended between Mystic Avenue and Somerville Avenue, and 1,709 square feet of granolithic sidewalks have been laid.

Two additional shelters have been built opposite the bath house at Nahant Beach and playground apparatus installed in the area at the rear.

The section of the Neponset River Parkway from West River Street near the exit from Stony Brook Reservation to Regent Street, Hyde Park, has been constructed.

Plans and surveys for the Northern Traffic Artery are nearly completed.

Neponset Bridge is substantially completed, the Old Colony Parkway from Quincy Shore Reservation to Freeport Street, Dorchester, constructed and considerable filling done in the section between Columbia Road and Fox Point.

West Border Road in the West Roxbury Parkway has been built from the pleasure drive to LaGrange Street.

Toilet facilities at the Riverside Recreation Grounds have been provided by remodeling and refitting a portion of one of the boat houses.

A section of the Lynn Shore sea wall, damaged by the storms of last winter, has been repaired.

Concrete walks, steps, curbs and a fence have been built in connection with the shelter building at the corner of Nantasket Avenue and the steamboat landing, and the interior refitted for use as a refectory.

The reservation drive from Eliot Circle to Revere Street, Revere, has been reconstructed, with bituminous concrete surfacing and concrete curb. Further reconstruction will be resumed in the spring.

The work of replacing gas lighting by electric lighting on the parkways has been started with a section from Eliot Circle to Northern Circle, Revere.

Repairs have been made upon bridges and locks and further important repairs will be necessary during the coming year.

IV. CHARLES RIVER BRIDGES

The new reinforced arch bridge with its approaches over the Charles River Basin at Western Avenue is virtually completed and was opened to traffic December 27, 1924. The bridge as constructed is a handsome and appropriate structure, a tribute to the judgment of the jury of architects who selected the design.

Plans and specifications for a new bridge over the Charles River Basin at Arsenal Street have been completed, the contract awarded, and work will commence in the spring. The bridge, consisting of two reinforced concrete arch spans, will be 222 feet in length and 60 feet wide.

As a result of the recommendations of the Metropolitan Planning Division the Legislature passed Chapter 416 of 1924, combining in one structure the highway and railroad bridges at Cottage Farm. Consequently new plans have been prepared and submitted to the Boston & Albany Railroad, whose assent under the act is required. It has involved considerable study both on the part of the Commission and the Railroad, but it is expected that the problem is about solved and that the detail work of design and construction will progress rapidly during the coming year.

Harvard Bridge, under authority of an act passed in 1924, has been strengthened and repaired, new flooring laid and resurfaced, the movable draw fixed and widened, and a new street lighting system is being installed. The work is substantially completed and the bridge has been opened to traffic. The bridge at a relatively small cost has been rendered safe and adequate for traffic for many years.

V. RAINFALL AND CONSUMPTION OF WATER

The rainfall on all the watersheds was above normal in April and September and noticeably below normal during the latter part of the year. The Wachusett Reservoir filled by April 7 and continued full until May 31. During the remainder of the year it was drawn down steadily until on December 31 it was 15.02 feet below high-water mark. Although this is an unusually low level for this season of the year it is not excessive considering the low rainfall and the difficulties encountered by the water systems of many other cities and towns. There is no occasion for alarm lest there be an insufficient supply of water for the Metropolitan Water District even though the reservoir should not entirely fill during the coming spring. The available water in storage in the Wachusett Reservoir is sufficient for the requirements of the District, including water furnished the city of Worcester and towns of Brookline, Clinton and Framingham, for two consecutive years as dry as the driest years on record during the past fifty years.

During the year the city of Newton drew 98,762,000 gallons of water to supplement its own supply.

Under an extension of authority granted by the Commission on October 18, 1923, the city of Worcester operated its pumping station on the upper part of the Wachusett Reservoir, and from November 10 to the close of the year drew 240,000,000 gallons of water into its mains. Due to the continued low yield of its watersheds the city is now preparing additional pumping facilities to increase its capacity.

During the year 45,420,493,000 gallons of water were furnished to the 18 cities and towns supplied, equivalent to a daily consumption of 124,099,700 gallons, and for the estimated population of 1,300,000 at the rate of 95 gallons per capita per day, a decrease of 2 gallons per capita since 1923.

VI. SPECIAL INVESTIGATIONS

In accordance with the provisions of Chapter 25 of the Resolves of 1924 the Commission investigated and reported as to the feasibility, desirability and probable cost of constructing, operating and maintaining public bath houses on reservations or parkways under its control which border on rivers or ponds. The report is printed as House Document 420 of 1925.

In accordance with the provisions of Chapter 39 of the Resolves of 1924 the Commission investigated and reported upon the construction and cost of proposed routes through the Lynn Woods. The report is printed as House Document 211 of 1925.

In accordance with the provisions of Chapter 52 of the Resolves of 1924 the Commission considered the subject matter of House Document 606 of 1924 relative to the reconstruction of the main highway over the Nantasket Beach Reservation in the town of Hull and of the sidewalks along the same, and particularly as to the allocation of the cost thereof upon the town of Hull and of sidewalk betterments upon the abutters. The report is printed as House Document 113 of 1925.

VII. OTHER REPORTS

The reports of the Directors of Parks, Park Engineering, Water and Sewerage, with tables, statistics and financial statements, are herewith presented.

Respectfully submitted,

DAVIS B. KENISTON,

Metropolitan District Commissioner.

FEBRUARY 26, 1925.

REPORT OF THE DIRECTOR OF PARKS

HON. DAVIS B. KENISTON, *Commissioner, Metropolitan District Commission.*

MY DEAR SIR: — I submit herewith a brief report of the changes in, and work being done by, the Parks Division of the Metropolitan District Commission.

Hon. James A. Bailey, who was appointed Commissioner when this Commission was organized, resigned on December 10, 1924. He was most untiring in his efforts to help in the management of its many problems, and under his able leadership much new work was successfully accomplished and many new plans for future development perfected.

Other important changes in the personnel of the Parks Division the past year have been as follows: —

Herbert W. West, Superintendent of Revere Beach Division and of the Metropolitan District Police, died on May 29, 1924. Mr. West was born in Cambridge on March 16, 1859. He began service for the Commonwealth in 1896, as a police officer at Revere Beach Reservation under the Metropolitan Park Commission, and in the same year was made Superintendent of the Reservation, in charge of the maintenance work and policing. In 1909, Mr. West was appointed a Captain of Police and placed in charge of Revere Beach Division, embracing Revere Beach, King's Beach, Lynn Shore and Winthrop Shore Reservations, and Revere Beach, Nahant Beach and Winthrop Parkways and Lynnway, to which were added, in 1911, Charles River Division, Lower Basin, including the Charles River Basin to North Harvard Street, and later Bunker Hill Monument. Chapter 406 of the Acts of the year 1922, authorized the Metropolitan District Commission to appoint Mr. West Superintendent of the entire Metropolitan District Commission police force, and his appointment by the Commission was made on June 12, 1922. He was serving in that capacity, as well as that of Superintendent of Revere Beach and Charles River Lower Basin Divisions, at the time of his death. Mr. West began his service in the formative period of Revere Beach Reservation and practically of the Metropolitan Park System. He saw under his immediate supervision the development of Revere Beach, in particular, from the raw condition which characterized it before public ownership to its present state, a beautiful shore reservation thronged with multitudes of people in the season. The task of putting into effect the policy which led to this development fell mostly on Mr. West, and his sound judgment and tact were large factors in shaping this policy and in making the reservation and the bath house what they are. Mr. West was a close friend and great admirer of the late Hon. Edwin U. Curtis, Police Commissioner of Boston, and during the police strike was in almost daily conference with Mr. Curtis and rendered him invaluable service, both personally and through the Metropolitan Park Police. Mr. West was a man of strict honor and integrity, and a stern but kindly and sympathetic disciplinarian. He was tactful and courteous in his dealings with the public, always being guided by the view, frequently expressed by him, that each member of the public was a partner in the public property under his supervision. His loss is severely felt in the administration of the Park System and by the Commission and his host of friends in public and private life. After his death Captain Spencer G. Hawkins was appointed in

his place as Superintendent of Maintenance of the Revere Beach Division. The position as Superintendent held by Captain Hawkins in Middlesex Fells Division has been filled by the promotion of Lieutenant Edward M. W. Brawley to the rank of Captain. Captain Chapman was appointed Superintendent of Charles River Division, Lower Basin.

Another important change was the retirement of Captain John L. Gilman on July 31, 1924, on account of ill health. Mr. Gilman began his service with the Metropolitan Park Commission on July 23, 1897, in the Revere Beach Bath House, under Superintendent West. On August 18, 1899, he was appointed Superintendent and Chief of Police at the Speedway. During the summer of the next year he was assigned to special duty as Superintendent and Chief of Police at Nantasket Beach Reservation. On April 1, 1908, Superintendent Gilman was also made Superintendent of the Riverside Section of Charles River Reservation, and in 1916 Beaver Brook Reservation was placed in his charge. In 1909, Mr. Gilman was made a Captain of Police. The trotting track of the Speedway was under the management of Mr. Gilman from the time it was constructed until the time of his retirement, and the satisfaction which this track has given to the owners of trotting horses and to the public who are fond of horses and sports of the track is due almost entirely to Superintendent Gilman. In his retirement the Commission has lost a skilled and faithful employee, and the best wishes of the Commission and of hosts of friends among the general public that he may enjoy many years of well-earned rest follow him into private life. Superintendent Gilman's position has been filled by the transfer of Lieutenant Frederick W. Garrett from Blue Hills Division to Charles River Upper Division, and his promotion to the rank of Captain.

On May 6, 1924, dedicatory exercises were held of the memorial erected on the Boston Embankment to Hon. Edwin U. Curtis, former Police Commissioner of Boston, and for so many years a member of the Metropolitan Park Commission. The Boston Embankment and the Charles River Basin were placed by law under the control of this Commission in 1910. From that time on the walk along the Basin was a favorite one with Mr. Curtis on his way to and from his office in town. As a member of the Metropolitan Park Commission, he took a personal interest and pride in the upkeep of the embankment, and it was peculiarly fitting that a spot on the embankment should be chosen as a site for this memorial. The fund for it was created by voluntary contributions from the hosts of Mr. Curtis' friends of every degree among the general public. A special committee of his friends and admirers received and administered this fund and contracted for and supervised the erection of the memorial. Although the memorial is unostentatious as was the man whom it commemorates, it is nevertheless a most attractive and graceful work of art.

The Harvard Bridge, which we have repaired and put in serviceable condition, is another addition to our system, and seems at present to be a most successful improvement. The Neponset Bridge is completed and is a great help to traffic conditions in this locality. Old Colony Parkway, from the bridge to Freeport Street, has been finished with the exception of a short distance near the railroad. At Freeport Street will begin the southerly approach of the proposed bridge across Dorchester Bay. Opposition now seems withdrawn to the building of the bridge at this location. The competition of architects on Western Avenue Bridge, just completed, and on Cottage Farm and other bridges which we are about to build at Arsenal Street and River Street over the Charles River, has been well worth while, and the same policy should be continued in preparation of plans for the bridge over Dorchester Bay. Much filling has been done on the Old Colony Parkway and we should be able to ask for bids to complete this work in the near future.

By Chapter 489 of the Acts of 1924, the Commission was authorized to lay out and construct the "Northern Artery," so-called, through Somerville and Cambridge, at a cost of \$2,400,000. The preliminary work is now under way. Plans are being drawn, takings are about to be made and work of construction should be started in the near future. It is hoped that we shall be allowed to use a space at least a hundred feet in width along the Charles River for this great lasting improvement.

The proposed extension of West Roxbury Parkway to the west from its present dead end is much needed, and should be built to Newton Street at once. The estimated cost of this extension is \$222,000. The Blue Hill River Road has been temporarily held up by conditions attached by the towns of Milton and Canton to the appropriations made by those towns for the construction of connecting roads, and some change of the act authorizing the Commission to build this road will be necessary before construction of the road can go on. In co-operation with the Appalachian Mountain Club, what is known as a "Sky Line Trail" has been built across Blue Hills Reservation. The principal peaks and most interesting parts of the Reservation are included, and since the new trails have been laid out, they have been used by large numbers of people. It is again recommended that Quincy Shore Drive be widened. The traffic here is very heavy and will be still greater when the Old Colony Parkway is constructed.

The usual precautions have been taken during the past year against the gypsy moth, and the moths seem now to be well under control. We have sufficient arsenate of lead on hand to do all work necessary in the different divisions the coming spring. This decrease in cost of labor and material should be quite a saving. During the past three years the sum of \$262,197.13 has been paid for moth work in all divisions.

The Commission continues its work of planting trees and shrubs in the various reservations and along the parkways. A large nursery is maintained near the headquarters on Pond Street, Stoneham, and last year 620 trees and 1,153 shrubs were set out there. In Blue Hills Division alone, 3,154,607 trees and 20,070 shrubs have been set out since 1907. In order to give an idea of the large amount of planting which is being done from year to year, the following table showing the number of trees and shrubs planted in the different divisions during the past five years, is given:—

	Trees	Shrubs
Blue Hills Division	272,375	4,070
Middlesex Fells Division	117,085	1,161
Charles River Division, Lower Basin	456	2,125
Charles River Upper Division	555	4,840
Revere Beach Division	395	50
Nantasket Beach Division	62	662
	<hr/> 390,928	<hr/> 12,908

For planting in 1925, about 130,834 trees and 800 shrubs can be used by the Captains of the divisions.

The lighting of our parkways has been very poor, but it has now been made possible to begin the installation of electric lighting. The first reservation to benefit by this change will be the Revere Beach Reservation. Magnetite arc lamps of 1,500 candle power are to be installed 100 feet apart from Eliot Circle to Revere Street, and 200 feet apart from Revere Street to Northern Circle, at an estimated cost for installation of about \$50,000. I strongly recommend that electric lighting be authorized for all the parkways.

The work done by our men in clearing the roads of snow after storms is not equalled by any city or town in this vicinity.

The vacant lots at Revere Beach not now required for our use should be leased for parking spaces, relieving the congestion on the boulevard and bringing in some revenue.

The Charles River Basin has been well patronized. The motor boats carrying passengers for hire around the Basin have been taxed to their carrying capacity. All are licensed by the Commission and inspected by the police, so that although thousands are taken around the Basin, no accidents have been reported. A new police boat has been used in this division some months, and does fine work, making twenty miles an hour and greater speed. The other police boats on the Basin, three in number, are over fourteen years old and will need renewing in the near future. Many have enjoyed the rowing on the river and the number of shells is increasing each year. The skating has been rather poor because of rough ice and snow.

The building of the Northern Artery will necessitate the moving of our present inadequate stables at the Charles River Basin. These should be remodeled and much enlarged. By raising slightly a good-sized garage could be made of the present basement without great expense. Many more cars and motorcycles will be needed here in the future.

The duties of traffic officers in Charles River Division, Lower Basin, have been greatly increased by taking charge of Harvard Bridge and the temporary bridge near Cottage Farm. Both bridges are policed day and night and carry very heavy traffic.

In Charles River Reservation, the Speedway has been well patronized by the general public as well as by the horsemen. More bridle paths have been laid out in this division. The road on the Boston side should be built through from North Harvard Street at Anderson Bridge to Bay State Road. Harvard College is about to expend many millions on its land here abutting on the Speedway Section, some of which has recently been sold to the College by the Commission. The extension of this road should eliminate much of the traffic jam which is a great problem now at the bridges. It could be connected with Commonwealth Avenue where it turns at Brighton Avenue, and relieve traffic congestion on that avenue. The bridge at Cottage Farm is poorly situated because of the grade made necessary by the railroad. It should have been located further down the river. A road under the proposed bridge will help if extended to Bay State Road. Without this the proposed Cottage Farm Bridge will not long take the place of the two bridges now in use there.

The Charles River Reservation and the Riverside Recreation Grounds have been well patronized, but the automobile stops the growth of canoe enthusiasm. In this division our police made 531 arrests the past year, and 59 rescues from drowning were made.

The three large bath houses at Revere, Nahant and Nantasket were operated as usual. At Revere a total number of 165,362 bathers used the bath house, and the total receipts for the season were \$37,672.15; at Nahant, total number of bathers, 46,644, receipts \$10,783.65; and at Nantasket, total number of bathers 86,257, receipts \$18,296.95. At Magazine Beach Bath House, on the Charles River in Cambridge, which was in existence at the time the Cambridge Park lands were conveyed to the Commonwealth and has since been maintained and operated by the Commission, there were 22,156 bathers during the season and the total receipts were \$4,447.55. The Commission also maintains a bath house at Hoosicwhisick Pond in Blue Hills Reservation, small bath houses in Charles River Reservation off Pine Grove at Newton Lower Falls and off Forest Grove Road, Norumbega Park, and two small wooden bath houses at Upper Mystic Lake, Winchester.

One hundred and thirty-three band concerts were given by the Commission during the summer of 1924. They were well attended and the sum of \$19,152.66 was expended for this purpose. The sum of \$847.34 was turned back into the state treasury from the appropriation.

The maintenance of the different divisions for the fiscal year 1924, has cost as follows:—

Blue Hills Division	\$243,525 83
Middlesex Fells Division	335,265 93
Charles River Division, Lower Basin	247,893 29
Charles River Upper Division	133,291 41
Revere Beach Division	253,160 97
Nantasket Beach Division	75,489 58

Our police force is the most efficient of its size and handles more people and automobiles per man than any in the country. Our men are gentlemen and really guardians of the peace who enforce the laws without show of weapons or bravado. Their duties have been greatly increased because of the wrongly named "Prohibition Amendment" and the increase in motor traffic and additional roads and bridges given over to the Commission for maintenance. In spite of these increases we have kept our force and expenses down. The total number of arrests during the year was 4,313; 157 found not guilty; 866 arrests for drunkenness; 123

arrests for operating while under the influence of liquor; 2,759 accidents reported; 616 injured and sick persons assisted; 67 rescued from drowning; 41 dead bodies recovered; value of property recovered, \$69,900.41. The amount appropriated for the Police Department was \$408,600. Of this amount \$401,900.04 was expended, leaving a balance of \$6,699.96. It is noted that the number of criminal cases handled by the department the past year is an increase of 23 per cent over the number handled the previous year; the fines show an increase of 26 per cent; the arrests for drunkenness an increase of 50 per cent; the arrests for operating motor vehicles while under the influence of liquor, an increase of 9 per cent.

The Police Department now consists of 6 captains, 4 lieutenants, 1 lieutenant inspector, 16 sergeants, 2 detective sergeants, 136 patrolmen, 1 police woman and 1 patrolman under Chapter 92, Section 63, of the General Laws. Two patrolmen have been retired and one discharged. The old-fashioned long-skirted dress coat, used as a part of the police uniform, is to be discarded, and an up-to-date reefer will take its place. Authority has been given to allow the officers, when on special duty, 75 cents for meals instead of 50 cents, which is the amount formerly allowed. The pay of patrolmen was advanced, as recommended 10 per cent, but no increase has been allowed by the Commission on Administration and Finance for the superior officers. The pay of the officers should be advanced as well as the pay of the patrol men; otherwise there is little incentive to do good work and seek promotion.

The 150th Anniversary of the Battle of Bunker Hill occurs in June of this year. The historical monument which commemorates the place where that great event took place was erected by the Bunker Hill Monument Association, an organization of patriotic citizens incorporated by Chapter 1 of the Acts of the year 1823, as amended by Chapter 122 of the Acts of the year 1825. By this act, the corporation was given power to take and hold, by gift, grant, devise or eminent domain, such real and personal property as might be necessary or convenient to promote the object of the incorporation in the construction of a monument in Charlestown "to perpetuate the memory of the early events of the American Revolution." Section 5 of the Acts of 1825 provided that when the monument had been completed it should be conveyed, together with all land purchased and held by the corporation, to the Commonwealth of Massachusetts, to be held by the Commonwealth, "on the condition that the Commonwealth shall keep the said monument and any buildings for public use connected therewith in good repair forever." The cornerstone was laid on the seventeenth day of June, 1825. The monument was not finally completed, however, until the summer of 1842, the last stone being laid on the twenty-third of July, 1842. From that time until 1919, the Bunker Hill Monument Association continued to care for and maintain the monument and grounds through private contributions. By Chapter 79 of the General Acts of 1919, the Metropolitan Park Commission was authorized to accept from the Bunker Hill Monument Association, on behalf of the Commonwealth, a conveyance of the land, monument and buildings set forth in the original act of incorporation, and thereafter maintain the land, monument and buildings for public uses and purposes consistent with those for which the Bunker Hill Monument Association was created and the monument erected. By deed recorded July 22, 1919, the Bunker Hill Monument Association conveyed the grounds and buildings to the Commonwealth, and the conveyance was accepted by the Metropolitan Park Commission, on behalf of the Commonwealth, so that now the responsibility for the proper maintenance of this historic site and monument rests with the Commission. Sufficient funds should be placed at the disposal of the Commission to keep this monument and the grounds around it in a condition and appearance consistent with the great event which they commemorate. The work of renovating its interior is now going on, and because of the dampness and smoke in this locality much care is required to maintain it in proper condition. The cost of maintenance this year has been \$9,732.93, and the receipts were \$3,866.80. During the year 38,668 people have climbed to the top of the monument.

The budget for the Parks Division for the year 1924 amounted to \$1,765,044.00. Only a small proportion of the people of the Metropolitan Parks District realize the amount of benefit derived from the Park System, — the great good for so many in the bathing facilities at the beaches, the opportunity for out-door exercise and

recreation in the Blue Hills and Middlesex Fells, and the continuous use of the parkways and roads by automobiles. The work which we are doing is lasting and the improvements worth while from every point of view.

Respectfully submitted,

FRANK G. HALL, *Director of Parks.*

DECEMBER 31, 1924.

REPORT OF THE DIRECTOR AND CHIEF ENGINEER OF PARK ENGINEERING

HON. DAVIS B. KENISTON, *Commissioner, Metropolitan District Commission.*

SIR:— I submit herewith report of the work done under the supervision and direction of the Engineering Department of the Parks Division, for the year ending December 31, 1924.

On account of increased amount of work authorized by the last legislature, in addition to work previously authorized and incompletd, it was necessary to materially increase the engineering force in the past year. Six additional parties of three men have been added, so that the force for the past year has averaged as follows: One Chief Engineer, 1 senior assistant civil engineer, 10 assistant civil engineers (6 more than last year), 2 inspectors, 2 designing engineers, 24 engineering assistants (11 more than last year), 4 clerks and stenographers, 1 garage foreman, 1 supervisor of machinery, 1 electrical engineer superintendent and 46 bridge and lock attendants.

In addition to work incompletd under two main contracts previously made, that for construction of Neponset Bridge and a section of Old Colony Parkway amounting to about \$800,000, ten new contracts have been made during the year for construction work amounting to a total of about \$1,053,026.34.

The work of preparing preliminary and construction plans for nine bridges, four of which were to be new bridges over the Charles River, and repairs to the Harvard Bridge, one railroad bridge at Furnace Brook Parkway and three bridges for Old Colony Parkway, has required considerable engineering services by the department. Two of these bridges and repairs to the Harvard Bridge are substantially completed, contract let for one other, the Arsenal Street Bridge over the Charles River, and plans and specifications completed ready to let contract for the River Street Bridge over the Charles River.

Other work of the department has included the supervision and direction of repair and maintenance work in the various divisions, the investigation and reports on restrictions and requests for permits, the supervision of the work done under the permits issued by the department and the care, repair and operation of bridges, locks, etc.

The cost of conducting the department has been as follows:—

Engineering:

Construction:

Services	\$39,351 89	
Expenses	4,737 14	
	<hr/>	\$44,089 03

Maintenance:

Services	\$30,984 89	
Expenses	2,480 45	33,465 34

Total		\$77,554 37
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The following is a detailed list of the work done under the direction of the Engineering Department.

PARKWAYS

Blue Hills Parkway.— Concrete sidewalks have been built in the easterly walk of Blue Hills Parkway where the abutters petitioned and agreed to pay one-half the cost of same. A total of 7,192 square feet has been built at a total cost of \$2,013.76. The work was done by John A. McCarthy.

Furnace Brook Parkway. — Contract No. 65: The work of constructing connecting link of Furnace Brook Parkway between Newport Avenue and Hancock Street, across the location of the New York, New Haven & Hartford Railroad, has been done under contract with A. G. Tomasello & Son, lowest bidder. Bids were received June 5, 1924. Work was begun June 12, 1924 and completed December 4, 1924.

This work included the construction of a bridge for the New York, New Haven & Hartford Railroad Company to allow the parkway to pass underneath the railroad, and the construction and surfacing of the parkway. The total cost of the work has been \$129,709.59.

Plans and specifications have been prepared for building a half-tide dam in Black's Creek, Furnace Brook Parkway, to hold the tidal waters in the Basin above the parkway drive for bathing purposes. Bids were received July 31, 1924, but on account of the provision in the act that the city of Quincy should accept the act and contribute a portion of the cost, which conditions the city has not yet wholly fulfilled, the work has not been begun.

Middlesex Fells Parkway. — Contract No. 75: The work of extension of drainage system, Middlesex Fells Parkway, between Mystic Avenue and Somerville Avenue, Somerville and Medford, has been done under contract with Carmine Russo, lowest bidder. Bids were received October 16, 1924. The work was begun November 1, 1924 and completed November 24, 1924, at a total cost of \$4,281.67.

Granolithic walks have been laid in sections of Middlesex Fells Parkway where the abutters have petitioned and agreed to pay one-half the cost. 1,709 square feet of walk have been laid under contract with C. L. Hoffman & Sons at a total cost of \$398.77.

Nahant Beach Parkway. — Contract No. 68: Two additional shelters have been built on the beach front opposite the bath house. Bids were received June 5, 1924, and the contract awarded to Cross & Roberts, lowest bidders. Work was begun July 9, 1924, and completed September 15, 1924, at a total cost of \$9,430.95.

Work of grading, draining and installing playground apparatus in the area at the rear of the bath house has been done by the forces of the Revere Beach Division at a total cost of \$3,023.75. A special item of \$5,000 was appropriated by the Legislature in the maintenance appropriation for this work. It is proposed to install additional apparatus in the spring, as that which was installed last year appeared to be popular and was used extensively.

Neponset River Parkway. — Contract No. 72: The work of constructing section of Neponset River Parkway from West River Street, near the exit from Stony Brook Reservation, to Regent Street, Hyde Park, has been done under contract with Frank Williams, lowest bidder. Bids were received September 4, 1924. The work was begun September 12, 1924 and completed November 7, 1924, at a total cost of \$10,000.00.

Northern Traffic Artery. — The work of making surveys and preparing plans for acquiring land for the Northern Traffic Artery, authorized by Chapter 489, Acts 1924, has been in progress during the year and is nearly completed.

Old Colony Parkway. — Contract No. 40: The work of constructing Neponset Bridge under contract with the Crandall Engineering Company, which was begun in July, 1922, is substantially completed. Traffic was turned on to the completed portion of the new bridge July 1, 1924, and the work of removing the temporary bridge and completing the Neponset approach, which could not be undertaken until the traffic was so diverted, was begun. The contract has not yet been closed as there are a few incidental items not yet completed, which could not be done during the winter weather.

Contract No. 61: The work of constructing the Old Colony Parkway from Quincy Shore Reservation, Quincy, to Freeport Street, Dorchester, under contract with James H. Fannon, which was begun October 4, 1923, was completed December 6, 1924, at a total cost of \$234,934.60.

Considerable filling material has been obtained from various sources in the form of ashes, cinders and solid filling material and deposited in the section between Columbia Road and Fox Point.

West Roxbury Parkway. — Contract No. 71: Work of constructing West Border Road, from the pleasure drive to LaGrange Street, has been done under contract with James H. Fannon, lowest bidder. The work was begun August 28, 1924 and was completed December 4, 1924, at a total cost of \$34,653.57.

RESERVATIONS

Charles River Reservation, L.B. — Contract No. 64: In connection with the work of constructing the Western Avenue and River Street Bridges over the Charles River Basin, it was decided to construct a roadway along the southerly bank of the river between the two streets, in order to divert traffic in both directions, so as to use one of the bridges for the traffic in both streets during the construction of the other bridge. By this method the necessity of constructing temporary bridges was avoided. Bids were received March 27, 1924 for the construction of this temporary roadway and the contract awarded to the lowest bidder, Rowe Contracting Company. The work was begun April 3, 1924 and completed May 27, 1924, at a total cost of \$10,191.70.

Contract No. 67: The plans and specifications for the construction of reinforced concrete arch bridge and approaches over the Charles River Basin at Western Avenue, Boston and Cambridge, were completed and bids received for the work June 18, 1924. The contract was awarded to T. Stuart & Sons Company, lowest bidder. The work was begun June 26, 1924, and was practically completed December 31, 1924, at a total cost of \$273,605.68.

The bridge consists of three reinforced concrete arch spans, the center span 88 feet and the two end spans 78 feet each. The total length of the structure is 328 feet and the width 60 feet. The new bridge was opened to traffic December 27, 1924.

Contract No. 69: By Chapter 442, Acts 1924, the Commission was directed to strengthen, repave and repair the bridge on Massachusetts Avenue across the Charles River Basin, between Boston and Cambridge, known as the Harvard Bridge. Plans and specifications were prepared for the work and bids received July 3, 1924. The contract was awarded to V. James Grande, lowest bidder. The work was begun July 14, 1924, and is substantially completed.

The work consisted of removing the old floor and stringers and strengthening the steel floor beams, substituting steel I beam stringers, a 6-inch yellow pine deck plank with 3½-inch granite block pavement laid on an asphalt mastic base with asphalt filler. A 12-inch concrete curb was built with concrete sidewalk and defective portions of the fence replaced.

The movable draw span was fixed in a stationary position and widened to the full width of the other portions of the bridge. All steel was cleaned and painted. A new street lighting system is being installed. The cost of the work to date is \$481,591.53 and it is estimated that the total cost will not exceed \$500,000.

Contract No. 74: Plans and specifications for bridge over the Charles River Basin at Arsenal Street, Boston and Watertown, have been completed and bids were received November 6, 1924. The contract was awarded to the lowest bidder, V. James Grande, but on account of lateness of season the beginning of the work was postponed until spring. The bridge consists of two reinforced concrete arch spans each 91 feet 4½ inches in length. The total length of the bridge is 222.18 feet and the width 60 feet. A temporary foot bridge will be constructed to allow pedestrian traffic during the construction of the work. Other traffic will be diverted to the North Beacon Street Bridge.

Charles River Reservation, U. D. — To provide toilet facilities for the Riverside Recreation Grounds a section of one of the boat houses has been remodeled and fitted for the purpose, at a total cost of \$3,634.13.

Lynn Shore Reservation. — Considerable damage was caused by storms of last winter to a section of the Lynn Shore sea wall. This section was constructed of granite by the former owners of the property before its acquisition by the Commission. The work of repairs was done by M. McDonough Company of Swampscott, under the direction of this department, at a cost of \$5,751.

Lynn Woods Reservation. — As required by Chapter 39, Resolves of 1924, investigation, surveys and estimates have been made of routes for a parkway through the Lynn Woods Reservation from Walnut Street, North Saugus, to the streets of the City of Lynn east of the reservation. Report has been made by

the Commission dated December 15, 1924, describing two alternative routes with recommendation for the one beginning at the Newburyport Turnpike at junction of Walnut Street, thence over Walnut Street to Walden Pond Road, over Walden Pond Road and Penny Brook Road, widened and straightened, a distance of about 6,500 feet, to a point near the junction of Great Woods. Thence across Tomlin's Swamp to a point on Waycross Road near Breeds Pond Reservoir; thence across two arms of Breeds Pond Reservoir and Dog Hill Island to the easterly boundary of the Reservation, near Linwood Street and B Street. It is proposed to cross the arms of the reservoir by solid filled causeways and two short span bridges to allow circulation of the water in the reservoir. The estimated cost of this route is \$471,500.00.

Nantasket Beach Reservation. — Contract No. 66: In connection with the construction of the shelter building at the corner of Nantasket Avenue and steamboat landing which was completed on November 30, 1923, it was necessary to construct concrete walks, steps, curb, fence, and fit up the interior with seats, counters, etc., for its use as a refectory. Bids were received April 24, 1924, and the work let to the lowest bidder, Archdeacon & Sullivan. The work was begun May 2, 1924 and completed June 16, 1924, at a total cost of \$9,561.65.

Revere Beach Reservation. — Contract No. 73: Bids were received September 11, 1924 for the reconstruction of the reservation drive from Eliot Circle to Revere Street, Revere, with bituminous concrete surfacing and concrete curb. The contract was awarded to the lowest bidder, Simpson Brothers Corp. The work was begun September 29, 1924, but suspended December 4, 1924, on account of winter weather conditions. The work will be resumed in the early spring.

Incidental to this work conduits were laid for the new electric street lighting system to be installed. Orders have been placed for the cables, and early in the spring it is expected to install the new lighting system which consists of magnetite arc lamps spaced 100 feet apart from Eliot Circle to Revere Street and 200 feet apart from Revere Street to Northern Circle.

BRIDGES AND LOCKS

All work of maintenance and repair of bridges and locks and operation of drawbridges has been done under the direction and supervision of this department.

The work of breaking ice in the Charles River Basin for the season 1923 and 1924 has been done by the Public Safety Department with boat hired for the purpose. The total cost has been \$13,855.88. The Public Safety Department has built a new police boat with which it is expected that the work of ice breaking will be done in the future. The boat began operations in the Basin on December 15, 1924, for this winter season.

It is expected that important repairs to the structural steel of the drawbridge will be absolutely necessary during the coming year, as defects have already appeared which have been temporarily repaired, and there is danger of serious damage to the structure which will put it out of commission and prevent its operation. An estimate for this work has been included in the budget for 1925.

The following is a record of the traffic through locks and drawbridges during the year: —

CHARLES RIVER DAM AND LOCKS

Number of openings, 4,531	Piling (lineal feet), 12,690
Number of vessels, 5,855	Sand (tons), 254,790
Number of boats, 2,926	Gravel (tons), 165,935
Lumber (feet B. M.), 2,610,000	Rubble stone (tons), 22,560
Coal (tons), 279,083	Granite (tons), 2,973
Oil (barrels), 1,508,260	Water (gallons), 9,000
Empty barrels, 24,336	Miscellaneous (tons), 1,500

There were 3,171 drawbridge openings.

The small boat lock was not used during the year.

Cradock Bridge Lock

Number of openings, 383	Number of boats, over rollway, 84
Number of boats, 520	

Temporary Cottage Farm Bridge

Number of openings, 8		Number of vessels, 15
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Malden River Bridge

Number of openings, 449		Number of vessels, 750
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Neponset Bridge

Number of openings, 635		Number of vessels, 1,249
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Saugus River Bridge

Number of openings, 232		Number of vessels, 369
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Wellington Bridge

Number of openings, 167		Number of vessels, 242
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GENERAL

The road repairs and maintenance have been done by the forces of the various divisions under the supervision and direction of the Engineering Department.

All bridges under the care and control of the Commission have been inspected twice during the year and estimates of cost of repairs included in the budget.

Respectfully submitted,

JOHN R. RABLIN, *Chief Engineer & Director of Park Engineering.*

FEBRUARY 16, 1925.

REPORT OF THE DIRECTOR AND CHIEF ENGINEER OF WATER DIVISION

DAVIS B. KENISTON, *Commissioner, Metropolitan District Commission.*

SIR: — I respectfully submit the following report of the construction and maintenance operations of the Water Division for the calendar year 1924.

ORGANIZATION

The organization and personnel of the supervising, clerical and engineering forces employed on maintenance work have remained substantially as at the beginning of the year. The forces employed on construction work have been increased by the appointment of several rodmen, instrumentmen and inspectors as required to attend to the increased amount of new work in progress. At the beginning of the year the number of these employees was 47 and at the end of the year 53, and in addition the labor forces engaged in maintaining and operating the reservoirs, aqueducts, pipe lines, hydro-electric stations and pumping stations and doing miscellaneous construction work was 330 at the beginning of the year and 342 at the end of the year.

METROPOLITAN WATER DISTRICT AND WORKS

During the year there has been no change in the boundaries of the Metropolitan Water District which includes 19 municipalities with an area of 167 square miles and an estimated population of 1,358,110. The water works lands include an area of about 19,000 acres of which about 2,000 acres have been planted with pine trees. The works include 9 storage reservoirs with 200 square miles of tributary watershed, storage capacity of 80,000,000,000 gallons and water surface of 8,600 acres; 60 miles of aqueducts; 2 hydro-electric power stations with a capacity of 7,000 horse power; 16 miles of high tension power transmission line; 5 distribution pumping stations with a combined equipment of 6,000 horse power and pumping capacity of 260,000,000 gallons a day; 12 distribution reservoirs with a combined capacity of 2,400,000,000 gallons and 136.14 miles of distribution mains. The consumption of water from these works during the year was 45,420,493,000 gallons, equivalent to an average daily consumption of 124,099,700 gallons, or 95 gallons per capita supplied.

CONSTRUCTION

PUMPING EQUIPMENT, SOUTHERN HIGH SERVICE

The work done this year in connection with the installation of the new pumping equipment at Chestnut Hill Station No. 1 for the southern high service includes the erection of an air chamber on the 30-inch discharge pipe from the new engine and the installation of a new smoke flue, soot blower, boiler feed water piping and blow-off drains, the application of the heat insulating covering and completion of the concrete floor in the boiler room. The entire work was completed April 1.

The total expenditure for the additional southern high-service equipment is \$183,069.90 of which \$2,957.55 was expended during 1924.

ARLINGTON RESERVOIR

At the beginning of the year about 95 per cent of the work on the masonry tower which encloses the Arlington Reservoir was completed. Early in the spring, as soon as the weather was favorable, the work of plastering balcony wall, waterproofing roof and washing down the masonry was undertaken and it was completed in June. Late in the fall the grounds surrounding the reservoir were graded and seeded and some shrubs were planted.

The total expenditure for the reservoir is \$226,804.07, of which \$46,456.62 was expended during 1924.

PUMPING EQUIPMENT, NORTHERN HIGH SERVICE

The concrete foundation for the new pumping engine at Spot Pond Station for the northern high service was completed July 1. The work of building new engine for this station was completed at the Snow-Holly Works of the Worthington Pump and Machinery Corporation in Buffalo in October, the work of erecting it upon the foundation in the pumping station was begun in October and was nearly completed at the close of the year, and the installation of the suction and discharge piping was practically completed at that time.

The gallery in the boiler room was extended to the new boiler, and heat insulating covering was applied to the boiler and parts of the smoke flue and steam piping.

An order for the steel frame work to support the cast-iron floor plates at the new engine was placed December 18.

The total expenditure for the northern high-service pumping equipment is \$85,258.01, of which \$69,240.85 was expended during 1924.

WESTON AQUEDUCT SUPPLY MAINS

At the beginning of the year about 60 per cent was completed of the work of laying two additional 60-inch cast-iron pipe lines on Section 1 of the Weston Aqueduct Supply Mains in Weston, extending from the terminal chamber of the Aqueduct to the Charles River. Work was continued through the winter by Bryne & Company with a small force and was completed June 23. The combined length of the two pipe lines laid is 3,239 feet. A new sluice gate and two new gate stands were installed in the terminal chamber for controlling the flow of water in the new pipe lines.

A contract was made with the T. A. Gillespie Company, February 1, for furnishing and laying 60-inch diameter lockbar steel pipes included in Section 9, extending northerly from pipe laid on Section 1, through River Street in Weston and South Street and private land in Waltham to Prospect Street. The first pipes were delivered for this work March 24, and pipe laying work was begun April 17 and completed September 19. The total length of pipe laid is 11,365 feet. The entire work under this contract was completed October 14.

A contract was made with the C. & R. Construction Company July 10, for furnishing and laying lockbar steel pipes 60 inches in diameter for Section 10 of the Supply Mains, extending northerly and easterly in Waltham from Section 9 at Prospect Street, through Sun, Fern and Felton streets, crossing the Common and through Central, Newton, Barton and Linden streets and Waverley Oaks Road to Beaver Brook Reservation.

The work of excavating trench and relocating existing underground structures was begun July 28, of delivering pipes September 19, and of laying pipes September 28. Although working most of the time in narrow streets with numerous underground structures good progress has been made on this section of the work,

8,335 linear feet of pipe line having been laid when work was suspended for the winter at the close of the year.

A contract was made with the T. A. Gillespie Company October 3 for furnishing and laying lockbar steel pipes 56 inches in diameter on Section 11 of the Supply Mains, extending northerly and easterly from Section 10, through Beaver Brook Reservation, Trapelo Road and Pleasant Street in Belmont and Pleasant Street in Arlington to Massachusetts Avenue at Medford Street.

The work of excavating trench and relocating underground structures was begun November 5, delivery of pipes November 17 and of laying pipes November 23. At the close of the year 2,830 feet of pipe line had been laid.

The total expenditure for the Weston Aqueduct Supply Mains is \$828,147.81 of which \$731,497.76 was expended during the year, and there are reserves held under current contracts amounting to \$61,185.29.

During the year easements for laying and maintaining water mains were taken in 7.058 acres of land in Waltham.

MAINTENANCE

PRECIPITATION AND YIELD OF WATERSHEDS

The precipitation on all the watersheds was noticeably above normal in April and September and noticeably below normal in March, June, July, October and December. The total precipitation for the year is 38.63 inches or 6.68 inches below the average on the Wachusett Watershed; 36.96 inches or 7.56 inches below the average on the Sudbury Watershed, and 37.40 inches or 7.74 inches below the average on the Cochituate Watershed.

The average daily yields of the watersheds for the year in gallons per day per square mile were 1,035,000 or about 6 per cent below the average for the past 28 years on the Wachusett Watershed; 841,000 or 13.9 per cent below the average for the past 50 years on the Sudbury Watershed, and 810,000 or 13 per cent below the average for the past 62 years on the Cochituate Watershed.

From October 8 to November 11 no precipitation was measured on any of the watersheds, while the total precipitation from September 30 to November 22 was only 1/6 of an inch on the Wachusett Watershed and 1/3 of an inch on the Sudbury Watershed.

The city of Worcester discharged 975,500,000 gallons of water into the Wachusett Reservoir Watershed from the area diverted in 1911 that was formerly tributary to the reservoir, but as all of the water was received before June 15 and the reservoir filled before that date no payment is required for this water under the agreement made with the city when the area was diverted.

STORAGE RESERVOIRS

The capacities of the storage reservoirs of the Metropolitan Water Works, the elevation of the water surfaces and the quantity of water stored in each reservoir at the beginning and at the end of the year are shown by the following table: —

STORAGE RESERVOIRS	Eleva- tion ¹ of High Water	Capacity (Gallons)	JAN. 1, 1924		JAN. 1, 1925	
			Eleva- tion ¹ of Water Surface	Amount Stored (Gallons)	Eleva- tion ¹ of Water Surface	Amount Stored (Gallons)
Cochituate Watershed: —						
Lake Cochituate ²	144.36	2,097,100,000	142.81	1,732,100,000	143.49	1,891,100,000
Sudbury Watershed: — . . .						
Sudbury Reservoir	260.00	7,253,500,000	258.23	6,516,400,000	258.17	6,491,700,000
Framingham Reservoir No. 1	169.32	289,900,000 ³	167.95	226,900,000	167.65	214,000,000
Framingham Reservoir No. 2	177.87	529,900,000 ³	177.38	541,000,000	177.49	545,900,000
Framingham Reservoir No. 3	186.74	1,180,000,000 ³	186.08	1,146,000,000	184.00	979,400,000
Ashland Reservoir	225.21	1,416,400,000	224.59	1,382,300,000	223.26	1,310,000,000
Hopkinton Reservoir . . .	305.00	1,520,900,000	304.25	1,473,900,000	302.93	1,392,400,000
Whitehall Reservoir . . .	337.91	1,256,900,000	336.63	1,009,400,000	337.38	1,153,600,000
Farm Pond	159.25	167,500,000	158.20	111,700,000	158.16	109,600,000
Wachusett Watershed: —						
Wachusett Reservoir . . .	395.00	64,968,000,000	386.77	54,253,100,000	379.98	46,296,600,000
Totals	-	80,680,100,000	-	68,392,800,000	-	60,384,300,000

¹ Elevation in feet above Boston City Base. ³ To top of flashboards.
² Excluding Dudley Pond which was abandoned April 3, 1916.

The table shows the total storage which could be drained from the reservoirs. Special provisions would be necessary, however, to draw about 10,000,000,000 gallons of this storage for consumption, as it is below the outlet channels which can be conveniently used for regular service.

Wachusett Reservoir

At the beginning of the year there was 54,253,100,000 gallons of water in the Wachusett Reservoir, the water being 8.23 feet below elevation 395, the designed high-water line. As a result of the spring rains and thaws considerable water was collected in the reservoir during the last week in March and early in April. Elevation 395 was reached April 7 and with the use of flash-boards the water was raised to elevation 396.3 by April 14, and was maintained near this elevation for about six weeks, the highest stage being elevation 396.39 on May 13 with 66,852,100,000 gallons in storage. This is the largest quantity of water ever stored in the reservoir.

From April 7 to May 31 flood flows amounting to 10,021,600,000 gallons or nearly 20 per cent of the available capacity of the reservoir, which could not be stored in the reservoir, was discharged into the Nashua River below the dam, and 4,029,500,000 gallons of this waste water was used to generate 856,420 kilowatt hours of electric energy, which was sold for \$4,539.

The maximum rate at which water was wasted from the reservoir was 960,000,000 gallons per day for a short time on April 19. After May 31 the draft for consumption exceeded the inflow and during the remainder of the year the water was drawn down steadily to elevation 379.98 or 15.02 feet below high-water line, leaving 46,296,600,000 gallons in storage at the close of the year. In addition to the water unavoidably wasted on account of flood flows 632,700,000 gallons was discharged into the river below the dam in accordance with the provision of General Laws, Chapter 92, Section 14, and under the provision of Acts of 1923 Chapter 348 the town of Clinton arranged with the Lancaster Mills for the installation and operation of a permanent pumping plant at the mill by which water from the reservoir is drawn from the Metropolitan Water Works 24-inch supply main and pumped into the town's distribution pipes. Since this plant was put into regular service on June 24 it has been operated almost continuously except on Sundays and holidays, with a total pumpage of 92,300,000 gallons.

Under an extension of authority granted by the Metropolitan District Commission October 18, 1923, the city of Worcester again operated its emergency pumping station on the shore of the reservoir at South Bay in Boylston and from November 10 to the close of the year pumped 240,200,000 gallons of water from the reservoir into its high-service mains. At the close of the year on account of continued low yield from its watersheds the city is installing a third pumping unit in the emergency station to increase the pumping capacity from 5,000,000 gallons per day to 7,000,000 gallons per day.

The usual work has been done in connection with the maintenance of the reservoir, brush and weeds have been cut and burned along the margin of the reservoir adjacent to highways and directly tributary streams for a distance of 64 miles at a cost of \$7,100.

The brook channel just west of the junction of Worcester Street and Beaman Street in West Boylston was paved for a further length of 225 feet this year, completing the work at this place.

Riprap along the shore of the reservoir for a distance of 7,000 feet, washed out by the high water in the spring, was repaired and reinforced with heavier stones at a cost of \$2,200.

Wire fences were erected along highways and property lines to enclose the water works lands for a distance of $6\frac{3}{4}$ miles in Clinton, Sterling and West Boylston at a cost of \$1,350 per mile exclusive of the posts obtained from the water works lands.

The structures at the Wachusett Dam, Clinton and Oakdale storage yards and eight department houses in the Wachusett Section, and the surrounding lands have been given the necessary attention. At the offices in the power station the woodwork was painted and new electric fixtures were installed.

The manometer on the 12-inch Venturi meter in the power station was replaced with a Type M register for measuring the flow in the 24-inch supply main to the Lancaster Mills, and the hydraulic valves were repaired. Windows in the gate chamber, damaged by the wind storm of May 24, were repaired and the boat landing at the dam, which was also damaged by this storm, was rebuilt.

At the Kramer house in Clinton a heater and electric lights were installed. At the Cook house in West Boylston, alterations were made on the first floor and the whole interior was renovated. At the Howe house in Sterling a bath room and electrically operated water supply were installed.

Standing grass on about 250 acres of water works land was sold, largely at auction, and \$786 was received therefor. As the grass was of poor quality there was little competition among the bidders.

Sudbury Reservoir

The water in Sudbury Reservoir was kept about 9 inches below the crest of the overflow at the dam until April 12 when the flash-boards were replaced on the overflow, and from December 3, when the flash-boards were removed, until the close of the year. From April 12 to December 3, while the flash-boards were on the overflow, water in the reservoir was kept about 6 inches above the crest of the overflow.

With the exception of 3,800,000 gallons of water that passed over the crest on March 11 and 12, due to a sudden and unexpected yield from the watershed, all the water drawn from the reservoir was used in generating electric energy at the Sudbury Power Station.

The usual care has been taken of the reservoir margins and of the walks, drives, shrubbery and grounds below the dam.

The department house, barn, shop and storehouse at the dam and all ironwork and life buoys have been painted. The upper tenement in the house at the dam has been vacant since April 28. The old Cratty house at Fayville was removed on July 30 by John Phillipso who had occupied it for many years while employed on the works.

Short sections of old fence have been repaired and 880 feet of new fencing has been constructed.

Framingham Reservoir No. 3

The entire water supply for the Water District has been drawn from the Sudbury Reservoir and Framingham Reservoir No. 3 and the water in these reservoirs has been kept at the desired elevation by drawing water from the Wachusett Reservoir as required.

The water in Framingham Reservoir No. 3 reached the highest stage in April, when it rose to elevation 186.80 or 0.3 of a foot above the top of the flash-boards, and was at the lowest stage, elevation 180.82, in November, when it was drawn down several feet below the overflow while the masonry was being repaired. The flash-boards were kept on the overflow throughout the year except when the repairs were in progress. During the year, 1,711,200,000 gallons of water not required for consumption or storage was wasted from Framingham Reservoir No. 3 into Framingham Reservoir No. 1 and thence into the Sudbury River below Dam No. 1.

The shores of the reservoir, the embankments, the grounds and shrubbery at the dam, and the gate-house and other structures were cared for as usual. Leaks in the stone masonry at the overflow in the dam were repaired late in the fall. Sprouts and undergrowth in the lanes through the woods along the property lines were cut and burned.

Framingham Reservoirs Nos. 1 and 2, Ashland, Hopkinton and Whitehall Reservoirs

No water was drawn for consumption during the year from the 47 square miles of the South Sudbury watershed tributary to Framingham Reservoirs Nos. 1 and 2, Ashland, Hopkinton and Whitehall reservoirs as the water from this portion of the Sudbury Watershed is usually highly colored and unsuitable for use without purification. At least 1,500,000 gallons of water a day has been wasted from Framingham Reservoir No. 1 into the Sudbury River below Dam No. 1 as required by Acts of 1872, Chapter 177.

On November 19, 20, 24 and 25, after the town of Framingham had completed the new pipe line connecting its pumping station with the Sudbury Aqueduct, 106,600,000 gallons of water was drawn from Framingham Reservoirs Nos. 1 and 2 to fill up Farm Pond which had been drawn down to facilitate work on the pipe line.

At the beginning of the year the water in Whitehall Reservoir was about 15 inches below high-water line on account of its having been drawn off to facilitate work on the new gate-house at the outlet, but during the year this reservoir has filled within 6 inches of high-water line. The elevation of the water in the other reservoirs has been varied as usual to provide for the seasonable requirements.

The dams, gate-houses and other structures and the lands about these reservoirs have been given the usual attention, and the lanes in the woods along the property lines have been cleared of sprouts and brush.

The department house on Salem End Road in Framingham, known as the Bullard house, occupied by the foreman in charge of these reservoirs, was painted.

At Ashland Reservoir 6,950 feet of wire fencing was built along the property line on the easterly side of the reservoir.

Farm Pond

On June 27 the stop-planks at the outlet of Farm Pond were removed to lower the water in the pond to facilitate the laying of a 16-inch cast-iron pipe line around the northerly end of the pond by the town of Framingham, to connect the town's pumping station with the Sudbury Aqueduct and to replace the old pipe line which is not suitable for further use.

In September the town set up an 8-inch and a 15-inch centrifugal pump near the outlet and pumped water out of the pond to lower it more rapidly, and on September 29 the work of laying the pipe line was begun with the water in the pond at elevation 155.20 or 4.0 feet below high-water line. The pipe line was laid with lead joints, with its top at about elevation 153 and was covered with earth about two feet deep. Work was completed, the old pipe line was discontinued and new pipe line put into service November 9, and since then the entire water supply of the town has been obtained from the Sudbury Aqueduct. November 19, 20, 24 and 25 the pond was refilled to elevation 158.02 with 106,600,000 gallons of water drawn from Framingham Reservoirs Nos. 1 and 2.

Prior to November 9, when the new pipe line was put into service, the town pumped approximately 128,900,000 gallons of water from its filter-galleries on the easterly shore of the pond, and during the year, under rights reserved by legislation, the Boston & Albany Railroad took approximately 71,600,000 gallons of water from the pond, and the New York, New Haven & Hartford Railroad took approximately 64,400,000 gallons of water from the pond for use of locomotives.

The riprap protection on the aqueduct embankment in the pond was repaired while the water was drawn down below the usual elevation.

A parcel of land situated on Hollis Street in Framingham, containing 0.32 of an acre, which was acquired by the city of Boston in 1872 in connection with the construction of a temporary channel to divert water from Farm Pond into Beaver Dam Brook to reinforce the supply in Lake Cochituate while the Sudbury River works were being constructed, was conveyed to James A. Turner.

Lake Cochituate

The water in Lake Cochituate was held about one foot below high-water line for use as an auxiliary supply in case of emergency, but no water was drawn from the lake for consumption during the year.

The lanes through the woods along property lines were cleared and the grounds, fences and structures on the shores of the lake and the channel for the diversion of surface water from Cochituate village were kept in good condition.

New wire fencing was erected along the property lines near Pegan Brook for a distance of 1,529 feet. The barn and shed at the foreman's headquarters and the ironwork at the gate-house and outlet dam were painted. A new furnace was installed in the department house, occupied by the foreman, and the plumbing was renewed in the kitchen.

AQUEDUCTS

Wachusett Aqueduct

Water was drawn from the Wachusett Reservoir through the Wachusett Aqueduct on 294 days. The total time that the aqueduct was in use is equivalent to 137 days, 5 hours and 31 minutes, during which time the total quantity of water discharged was 39,106,000,000 gallons, equivalent to 106,847,000 gallons per day for the entire year. All of the water was used to generate electric energy at the power station before it was discharged into the aqueduct.

The Westborough State Hospital pumped 71,722,000 gallons of water from the aqueduct at the terminal chamber during the year, or an average of 196,000 gallons per day.

New wire fencing was erected along property lines for a distance of 900 feet. A single story wooden frame building 19 feet by 28 feet was built by the regular maintenance force, largely from materials on hand, as an addition to the workshop near the terminal chamber.

The iron fences at the bridges over the Assabet River and at the highway crossings, and at the upper and lower dams of the open channel were painted.

A parcel of land containing 1.66 acres near the open channel in Southborough was transferred to the Commonwealth by James B. Johnson in exchange for a right of way to his land over the aqueduct land.

Brush, grass and weeds were mowed and disposed of for a distance of 10 miles along the aqueduct at a cost of about \$200 per mile.

In order to rectify the property lines Wachusett Aqueduct lands in Southborough were exchanged with adjoining owners as follows: The Commonwealth conveyed 0.05 of an acre of land to James B. and Lexy C. Johnson and acquired 0.05 of an acre in exchange; the Commonwealth conveyed 0.233 of an acre to Clarissa F. Clapp and received 0.183 of an acre in exchange; the Commonwealth conveyed 0.101 of an acre to Helen L. and Alida C. Masten and acquired 0.024 of an acre in exchange.

Sudbury Aqueduct

The Sudbury Aqueduct was shut off from regular service on four occasions; on May 12 for 15 hours to install new and larger piping for the recording gage at the Farm Pond gate-house; on September 30 for 4 hours to inspect the regulating gate at the entrance to the aqueduct at Dam No. 1; on November 19 and 20 for 17½ hours and on November 24 and 25 for 17½ hours while refilling Farm Pond. With these exceptions the aqueduct has been in continuous use for drawing water from Framingham Reservoir No. 3 from which 21,542,700,000 gallons was drawn during the year, of which 326,000,000 gallons was pumped by the town of Framingham to supplement its supply from the filter-galleries at Farm Pond and 21,216,700,000 gallons, or an average of 57,969,100 gallons per day was delivered to the Chestnut Hill distributing reservoir for consumption in the Water District.

The regulating gate at the upper end of the aqueduct near Dam No. 1, which had worked loose in the masonry as a result of the vibration caused by the flow of the water, was securely fastened with iron braces and the brick masonry was repaired.

The work of cutting and disposing of grass, brush and weeds, painting ironwork, cleaning culverts and repairing fences and caring for the aqueduct lands and structures was attended to as usual.

Weston Aqueduct

The Weston Aqueduct is not usually in service on Sundays and holidays. Water was drawn from the Sudbury Reservoir into the aqueduct this year on 309 days, the total time which the aqueduct was in use being 219 days, 2 hours and 20 minutes, and the total quantity of water drawn from the Sudbury Reservoir and discharged through the Weston Aqueduct into Weston Reservoir was 22,943,200,000 gallons for consumption, equivalent to an average of 62,686,300 gallons per day.

The ironwork under the floor in the head-house and the iron and wood work in the siphon and gaging chambers and all manhole covers along the aqueduct line were painted.

Grass, weeds and brush were cut and disposed of along the aqueduct and the culverts were cleaned of sediment and kept free from snow and ice during the winter. Fences were repaired where necessary.

A new furnace was installed in the department house at Nobscot, known as the White place, and plumbing was repaired in the kitchen. This house was vacant from April 15 until June 16.

On September 18 a parcel of Weston Aqueduct land situated in Weston, no longer required for water works purposes, containing 3.54 acres, was conveyed by the Commonwealth to Louis W. Deane.

Cochituate Aqueduct

The Cochituate Aqueduct was not in use during the year but was kept in readiness for immediate use in case of emergency. The ironwork in the waste-weirs and all manhole covers along the aqueduct have been painted. Grass, brush and weeds along the line have been cut and disposed of and the culverts were kept clear of snow and ice during the winter.

An exchange was made of Cochituate Aqueduct land located near the junction of Commonwealth Avenue and Grant Avenue in Newton, by which the Commonwealth conveyed 291 square feet of land to Frederick A. Ward and others and acquired 805 square feet of land.

PROTECTION OF WATER SUPPLY

A sanitary inspector, two watershed inspectors and three watchmen were employed throughout the year to inspect the condition of premises on the watersheds and ice cutting operations and to prevent pollution of the water in the reservoirs. Filters have been operated at Sterling, Sterling Junction, West Boylston, Marlborough and Natick throughout the year to prevent pollution of the water supply at these places, and any large flows of surface water in excess of the capacity of the filters was sterilized with calcium hypochlorite before it entered the reservoirs.

The pumping station and filters at Pegan Brook, used for purifying the water of Pegan Brook in Natick before it enters Lake Cochituate, have been operated when necessary during the year. The pumping station was operated on 199 days and 299,790,000 gallons of surface water was pumped from the brook to the filter-beds. This is equivalent to an average flow of 819,098 gallons per day for the entire year. The cost of operating the station, including the care of the grounds and filter-beds was \$7,074.14, or at the rate of \$23.60 per million gallons pumped and filtered.

About 1,800 cubic yards of mud and silt which had collected in settling basin on Marlborough Brook above the filter-beds was removed and disposed of on adjoining land.

Wire fencing was constructed along 1,710 feet in Big Crane Swamp, Northborough, to keep cattle on the adjoining farms from having access to the drainage ditches. Three sections of drainage ditches constructed during 1897 in Big Crane Swamp in Northborough and Westborough were reconstructed for an aggregate length of 4,565 feet by deepening, replacing most of the board bottom, sills and corner strips and repaving with heavier stones. This work included the replacement of four wooden bridges at cart road crossings, one with a 24-inch iron pipe culvert with concrete headwalls and the other three with concrete box culverts. This work cost about \$4,500.

Swamp drainage ditches of an aggregate length of 37 miles were given the usual attention and brush and weeds were cut for a width of 10 to 20 feet along both banks, the sediment being removed from the ditches, culverts and watering places and repairs made.

The bed of the brook between East Waushacum Pond and Middle Waushacum Pond in Sterling was improved for a distance of about 2,300 feet by deepening, widening and grading so as to lower the water in the East Pond to the minimum elevation to which we have the right to draw down the water.

A parcel of land containing 0.08 of an acre with buildings thereon, located on the west shore of Middle Waushacum Pond in Sterling, was acquired from Edith M. Loring for the protection of the water supply.

CLINTON SEWAGE DISPOSAL WORKS

The works for disposing of the sewage of the town of Clinton were operated as required by Acts of 1898, Chapter 557. From April 7 to 28, inclusive, May 1 and 2, May 13 to 18, inclusive, the sewage flow exceeded the capacity of the pump and overflowed into the Nashua River but was properly purified by dilution with the large quantity of waste water from the Wachusett Reservoir. On the remaining 337 days the sewage was pumped to the filter-beds and averaged 1,422,000 gallons per day. The cost of operating the pumping station was \$3,701.06 or \$0.155 per million foot gallons of sewage pumped, about 45 per cent of the cost being for labor. The cost of operating the filters and irrigation area, which it was necessary to use from March 31 to April 6, inclusive, and from September 22 to October 13, inclusive, because of the inadequate capacity of the filter-beds, was \$9,833.06, or at the rate of \$20.52 per million gallons of sewage disposed of.

The electric transmission line, over which power is transmitted from the Wachusett Dam for operating the pumping station, was rebuilt for a distance of 4,400 feet through Boylston, Chestnut and Mechanic Streets in Clinton.

The two department houses on High Street in Lancaster near the filter-beds were painted on the outside.

FORESTRY

In the Wachusett Section 31,000 red pines three years old were planted on 26 acres of water works land along streams in Holden and Sterling tributary to the Wachusett Reservoir, on the shores of the reservoir in West Boylston, along the open channel of the Wachusett Aqueduct in Marlborough and at the head of Big Crane Swamp in Westborough.

In the Sudbury Section 300 white pines from four to six feet high were set out between the Boston Road and the swimming pool in Southborough, and 5,000 white pines 4 years old were set out on the Weston Aqueduct land in Nobscot.

In the Distribution Section 25,000 white pines and 3,000 hemlocks three years old were set out on the westerly and southerly shore of Spot Pond in Stoneham, and 150 white pines five to six years old were set out on the shore of the Weston Reservoir at Cooper's Cove.

The nursery work included transplanting of 9,000 red pines three years old and 5,000 mugho pines one to three inches high in the Wachusett Section Nursery at Oakdale, and of 15,000 red pines two years old, 1,000 red pines three years old, 9,000 Norway spruces four years old and 2,000 mugho pines one year old in the Sudbury Section Nursery in Southborough. There are now about 39,000 plants in the Wachusett Section Nursery and 45,000 plants in the Sudbury Section nursery.

About 11 acres of Wachusett Reservoir land in West Boylston and along the open channel of the Wachusett Aqueduct in Marlborough was cleared for planting. Improvement cuttings were made in about 10 acres of hard wood growth and 134 acres of pine plantings on the Wachusett Reservoir lands.

As a fire preventive measure the undergrowth was cut in the plantings along the highways on an area of about 85 acres in the Wachusett Section and about 100 acres in the Sudbury Section.

The marginal fire guards and forest roads from 15 to 45 feet in width were mowed for a length of 43 miles in the Wachusett Section and of 21 miles in the Sudbury Section.

The usual work was done to protect the plantings from the pine tree weevil and trees on selected areas from insects. About 850 currant and gooseberry bushes were destroyed as a protection against the white pine blister rust.

The total expenditure for forestry for the year is \$34,780 of which \$5,800 was expended for protecting the trees from insects.

Cordwood, fence posts and lumber have been obtained from operations of the department, including 35,000 board measure feet of first quality white pine timber from cuttings of matured trees in the groves near the foreman's house at Lake Cochituate, and 3,600 chestnut posts and 12,000 board measure feet of chestnut lumber cut on the Sudbury Reservoir land, and all of the chestnut fence posts used in building fences in the Wachusett Section, which were cut on the Wachusett Reservoir lands.

The cutting of standing chestnut timber and intergrown white pine and hardwood trees on about 825 acres of Wachusett Reservoir land, which was begun by the Wilder, Walker & Davis Company, of Sterling, December 20, 1923, has been in progress throughout the year and in accordance with the terms of the contract \$8,450 has been paid by the Company. As the total amount to be paid by the Company for the timber to be cut under this contract is \$9,750, about 87 per cent of the work was completed at the close of the year.

HYDRO-ELECTRIC SERVICE

During the year 14,160,286 kilowatt hours of electric energy were delivered from the hydro-electric stations operated by water drawn from the Wachusett and Sudbury reservoirs. The total value of this energy at contract prices, including rentals of \$139 for transmission line locations, is \$79,271.54. The total expense charged to operation of both stations and transmission lines is \$44,358.40, leaving a profit from the operation of the stations of \$34,913.14, equivalent to \$2.466 per thousand kilowatt hours. Of the total energy delivered from both stations this year, 1,068,863 kilowatt hours of energy, for which \$5,866.77 was received, were generated with water wasted from the reservoirs and not required for water supply.

Wachusett Service

Additional line switches were installed at the switchboard in the Wachusett Power Station to facilitate operations. A cracked wedge in the 48-inch hydraulic gate on the No. 4 penstock line was repaired with stay bolts and fitted with a new and heavy composition stem nut.

A partial interruption in the running of the station occurred on January 22 when anchor ice which formed on the reservoir during the preceding night as a result of the action of the extremely low temperature and very high wind on the open water in the reservoir. The ice crystals which formed under these conditions were churned up with the water and blown against the dam, where they were drawn against the screens in the screen chamber, closing the openings in the screens, which were broken and carried with the ice through the penstock lines and water wheels causing some damage to the wicket gates. This is the first case where trouble of this nature has developed during the thirteen years of operation.

During the severe blizzard of March 11 and 12 the Wachusett Station was in continuous operation for about 36 hours, the service from all other stations in the vicinity being interrupted during this period.

The Wachusett Power Station was operated on 294 days. The statistics for the year 1924 are as follows: —

Total energy developed (kilowatt hours)	9,069,500
Energy used at power station (kilowatt hours)	178,410
Available energy (kilowatt hours)	8,891,090
Water used (gallons)	43,135,500,000
Average head (feet)	94.0
Energy developed per million foot gallons (kilowatt hours)	2.237
Efficiency of station (per cent)	71.18
Credits:	
Energy sold New England Power Company and Edison Electric Illuminating Company, 8,705,018 kilowatt hours at \$0.0053	\$46,136 60
Deduction of 2 per cent as provided in contract, 174,100 kilowatt hours at \$0.0053	922 73
	<hr/> \$45,213 87
Energy furnished Clinton Sewerage Pumping Station, 186,072 kilowatt hours at \$0.0053	\$986 18
Rental, transmission line location	139 00
	<hr/> \$46,339 05

Charges:

Superintendence	\$1,159 61	
Labor, operating station	10,016 81	
Repairs and supplies:		
Power station, \$1,598 53 }		
Transmission line 97 94 }	1,696 47	
	<hr/>	
	\$12,872 89	
Taxes	3,250 00	
Administration, general supervision, interest and sinking fund	8,995 06	25,117 95
	<hr/>	
Profit		\$21,221 10
Cost of available energy per thousand kilowatt hours		\$2.825

Sudbury Service

The Sudbury Power Station was in service on 309 days during the year and, with the exception of 3,800,000 gallons of water wasted over the dam in March, all the water drawn from the Sudbury Reservoir was used to generate electricity.

Statistics for the year 1924 are as follows:—

Total energy developed (kilowatt hours)	5,278,550	
Energy used at power station (kilowatt hours)	9,354	
	<hr/>	
Available energy (kilowatt hours)	\$5,269,196	
Framingham Reservoir No. 3 service:		
Water used (gallons)	22,771,300,000	
Average head (feet)	66.04	
Weston Aqueduct Service:		
Water used (gallons)	23,441,800,000	
Average head (feet)	38.13	
Energy developed per million foot gallons (kilowatt hours)	2.202	
Efficiency of station (per cent)	70.1	
Credits:		
Energy sold Edison Electric Illuminating Company of Boston, 5,269,196 kilowatt hours at \$0.00625		\$32,932 49
Charges:		
Superintendence	\$1,401 70	
Labor, operating station	10,710 75	
Repairs and supplies	413 82	
	<hr/>	
	\$12,526 27	
Taxes	1,860 00	
Administration, general supervision, interest and sinking fund	4,854 18	19,240 45
	<hr/>	
Profit		\$13,692 04
Cost of available energy per thousand kilowatt hours		\$3.651

DISTRIBUTION PUMPING STATIONS

The total pumpage at the five distribution pumping stations during 1924 was 34,439,629,000 gallons; 175,267,000 gallons or 0.5 per cent less than in 1923. The cost of operating all of the pumping stations for the year 1924 was \$197,576.19.

At the beginning of the year there were 1,902 net tons of bituminous coal and 1,092 net tons of anthracite screenings on hand at the pumping stations. During the year, 7,769 net tons of bituminous coal and 3,042 net tons of anthracite screenings were received. At the close of the year 1,100 net tons of bituminous coal and 550 net tons of anthracite screenings were on hand at the pumping stations.

At Chestnut Hill Station No. 1 a new pinion and gear were installed for engine No. 16 governor drive. The governor was securely braced to prevent vibration and now operates in a satisfactory manner. The difficulty of maintaining air in

the discharge air chamber in Engine No. 16 was remedied by removing the old baffle diaphragms from the equalizer pipes and installing two new diaphragms with openings 2 inches in diameter.

A new baffle plate was installed to improve the operation of the coal conveyor. The work of relocating flue and economizer and installing soot blower was completed and they were put into regular service early in the year.

In January a fire was discovered in the coal stored in bins Nos. 2 and 3 at Station No. 1, which had heated in storage, and it was necessary to remove about 240 tons from the bins and pile it on the grounds outside the building and later move it back for use in the station. This work cost about \$713 and in addition considerable damage was done to runs and partitions in the building.

At Chestnut Hill Station No. 2 necessary repairs have been made on all the engines and to the boilers and economizers. On account of the reduction in the force employed at the Chestnut Hill stations it was not possible to do considerable work that should have been done to keep the plant in first class condition. The more important repairs have been made, so far as possible, with the force available.

At the Spot Pond Pumping Station the work of relocating the 8-inch steam main in connection with the installation of the new 5-inch steam main was completed, and a Westinghouse turbo generator lighting unit of 1½ kilowatts capacity was installed for use at times when the large unit is not required.

The usual miscellaneous repairs have been made at the Arlington and Hyde Park stations during the year.

All machine shop work for the pumping stations and other sections of the Water Division has been done at the machine shop at the Chestnut Hill pumping stations.

The station duties based on plunger displacement and with no allowance for steam used for heating and lighting have averaged as follows:—

Chestnut Hill Station No. 1, 105,739,000 foot pounds per 100 pounds of mixed coal averaging 13,500 British thermal units per pound.

Chestnut Hill Station No. 2, 131,368,000 foot pounds per 100 pounds of mixed coal averaging 13,500 British thermal units per pound.

Spot Pond Station, 112,367,000 foot pounds per 100 pounds of mixed coal averaging 13,800 British thermal units per pound.

Arlington Station, 66,662,000 foot pounds per 100 pounds of mixed coal averaging 13,300 British thermal units per pound.

Hyde Park Station, 56,780,000 foot pounds per 100 pounds of mixed coal averaging 13,100 British thermal units per pound.

DISTRIBUTION RESERVOIRS

The locations, elevations and capacities of the distribution reservoirs of the Metropolitan Water Works are shown by the following table:—

DISTRIBUTION RESERVOIRS AND LOCATIONS	Elevation of High Water ¹	Capacity in Gallons
Low Service:		
Spot Pond, Stoneham and Medford	163.00	1,791,700,000
Chestnut Hill Reservoir, Brighton district of Boston	134.00	300,000,000
Weston Reservoir, Weston	200.00	200,000,000
Mystic Reservoir, Medford	157.00	26,200,000
Northern High Service:		
Fells Reservoir, Stoneham	271.00	41,400,000
Bear Hill Reservoir, Stoneham	300.00	2,450,000
Northern Extra High Service:		
Arlington Reservoir, steel tank, Arlington	442.50	2,000,000
Southern High Service:		
Fisher Hill Reservoir, Brookline	251.00	15,500,000
Waban Hill Reservoir, Newton	264.50	13,500,000
Forbes Hill Reservoir, Quincy	192.00	5,100,000
Forbes Hill Standpipe, Quincy	251.00	330,000
Southern Extra High Service:		
Bellevue Reservoir, steel tank, West Roxbury district of Boston	375.00	2,500,000
Total	—	2,400,680,000

¹ Elevation in feet above Boston City Base.

By arrangement with the city of Chelsea a portion of the maintenance of its reservoir on Powder Horn Hill is assumed by the Metropolitan Water Works, and the reservoir is used when necessary in connection with the northern high service supply. This reservoir has a capacity of 1,000,000 gallons with high-water line at elevation 196.6. The reservoir was in service from January 2 to May 6, during the day time for several days in October to drain the water down to repair a crack in the concrete lining on the inside slope between the old concrete and the new concrete placed in 1904 and from November 22 to the end of the year. A chain link, non-climbable fence 6 feet in height and 515 feet in length was erected on the outer top edge of the reservoir embankment at a cost of \$877, to prevent trespass on the reservoir.

The city of Malden standpipe on Waitt's Mount, which is under the care and control of the Division, has not been used during the year but has been kept full of water for use in case of emergency. Its capacity is 1,120,000 gallons with high-water line at elevation 250.

The Mystic Reservoir was not in service during the year but was kept full for use in an emergency. The wooden steps at the southeasterly side of the reservoir were rebuilt and the stone steps near the gate-house were reset and repairs were made in the gate-house. Under an agreement with the officials of Tufts College, which adjoins the reservoir, two special police officers of the cities of Somerville and Medford, employed by the college, were appointed Special Metropolitan District Police, November 19, so that they could maintain order on the reservoir lands.

The stone masonry of the dam at the outlet of Mystic Lake was repointed, the apron below the dam was repaired with large stones and concrete and the flooring over the stop-planks was repaired and painted; and some necessary repairs were made to the inlet gate-house of the Mystic conduit at Mystic Lake and to the outlet gate-house at Jerome Street.

Arlington Reservoir was put in service again May 25, following the completion of the masonry tower. The grounds about the tower were graded and seeded and some shrubs were planted late in the year. The masonry tower was open to the public, under supervision of the Metropolitan Park Police, on Sundays and holidays between 2 p.m. and sunset from September 21 to December 1.

The woodwork and ironwork at the gate-houses at Spot Pond, Bear Hill and Fells reservoirs and the fence at Bear Hill Reservoir were painted. The gutters on Main Street along the beaches have been banked with loam to prevent overflow of surface water into Spot pond.

Under the provisions of Acts of 1924, Chapter 240, loaded instead of blank cartridges were used to drive gulls and other birds from the waters of Spot Pond and Chestnut Hill reservoirs, beginning November 17. Although the firing was done with a view to frightening instead of killing the birds, one gull was killed at Spot Pond November 28, and one duck was killed at Chestnut Hill Reservoir on December 18. Better results than formerly are now being obtained in keeping the birds off of these waters.

The Park Division has been paid \$1,087.70 for police service at Spot Pond and \$4,475.24 for police service at Chestnut Hill Reservoir.

The Bradlee Basin of Chestnut Hill Reservoir was in service throughout the year and the Lawrence Basin from January 1 to February 6, from April 7 to August 16 and from August 29 to October 6.

The old wooden fence 845 feet in length along Beacon Street and the Parkway at the Lawrence Basin was replaced by a new fence with concrete posts and new iron pipe rails.

At Fisher Hill Reservoir the stonewall along the westerly property line was rebuilt and the interior of the gate-house was cleaned and floor and gate stands were painted.

The water in Forbes Hill Reservoir was drawn down to about elevation 190 for repairing concrete slopes where cracked, near the high-water line. The interior woodwork of the gate chamber and tower was painted and the stone steps on the reservoir embankment were repointed.

At Bellevue Reservoir joints in the cap stones on the parapet wall were repointed and waterproof compound was applied to the joint between the roof and parapet wall, and some painting was done in the interior of the tower.

The tower has been open to the public from 2 P.M. to sunset on Sundays and holidays throughout the year under the supervision of the Metropolitan Park Police.

New stop-planks and screens were made for the terminal chamber at Weston Reservoir and some painting was done at the channel and terminal chambers. About 480 feet of wooden rail fence was rebuilt along the driveway between Loring Street and the terminal chamber.

The grounds and structures at all of the distribution reservoirs have been given the necessary attention to keep them in good condition and the sluice gates and screens have been operated as required to maintain satisfactory service.

DISTRIBUTION BUILDINGS AND GROUNDS

The repairs to the roofs of the gate-houses and pumping stations at the Chestnut Hill Reservoir and the gate-house at the Waban Hill Reservoir, begun last year, have been completed. The roofs of the pumping station and gate-houses at Spot Pond have been repaired by replacing broken and cracked tiles, doing necessary work on gutters, conductor pipes and flashings, and replacing copper roof over the boiler room and coal bins with a composition roof. This work was done by contract at a cost of \$2,320. The necessary carpentry and masonry work was done by the department force.

Alterations have been made in the main building formerly used as a stable at the Glenwood pipe yard to fit it for use as a garage and locker and wash room, and minor repairs have been made to other parts of the building.

Carpenter shop at the Chestnut Hill Reservoir was moved from the wooden building at the pipe yard to the masonry building located between the Chestnut Hill pumping stations, formerly used as a stable and now partly utilized for the machine shop. In connection with this change power operated wood-working machinery has been installed, materially increasing the amount of work accomplished by the carpenter.

The woodwork of the garage adjoining the old stable was painted.

DISTRIBUTION PIPE LINES

About 300 feet of wire fencing was erected to enclose land between Loring Street and River Street, in Weston, in which the Weston Aqueduct Supply Mains are located.

The use of the Woodland pipe yard in Newton was terminated August 31.

The meter register tank at the emergency connection with the city of Cambridge, at Cambridge Common, was removed on April 18 on account of the widening of Massachusetts Avenue which brought the tank into the street.

Joint leaks in the 36-inch mains under the Mystic River at Wellington Bridge were examined by a diver on November 5. The largest leaks were found at the sleeves which were used in repairing the up-stream line which was accidentally broken in 1914 in connection with dredging operations in the river. A contract for repairing these leaks was made with George M. Bryne of Winchester, and work was begun December 16 but had not been completed at the end of the year.

A 12-inch branch was installed in the 16-inch southern high-service Metropolitan Main in Common Street near Grenville Road in Watertown, July 1. A connec-

tion was made with this branch by the Watertown water works officials on August 28. This connection is provided for emergency service for the top of Meeting House Hill until additional pressure is permanently furnished for this section of the town.

On December 31 the southerly of the two new 60-inch Weston Aqueduct Supply Mains extending from the terminal chamber to the existing mains under the Charles River was put in service.

Minor repairs were made to the pipe box supporting the 30-inch low-service main north of the tunnel under the channel at Chelsea North Bridge and to the pipe box at the Fox Hill Bridge over the Saugus River at the Lynn-Saugus boundary line.

In connection with the rebuilding by the Eastern Massachusetts Street Railway of the trestle over the Pines River at the Revere-Saugus boundary line the pipe box was removed from our 16-inch supply main and temporary supports were installed until after the trestle was completed when the pipe was permanently supported on the new trestle and the pipe box was rebuilt.

Only minor work has been required in connection with the other pipe bridges.

There were 51 leaks discovered in the Metropolitan Mains during the year which were repaired at a total cost of \$3,828.04. Of this number 13 were at defective wooden joints, the cost of repairing being \$950.12. Of the remainder 32 were at lead joints in cast-iron mains and 6 were in the old kalamine pipe purchased from the town of Swampscott in 1909.

There are now 72 Venturi meters from 6 to 60 inches in diameter in the distribution pipe lines. Sixty-two of these and 12 small disc, torrent and detector meters, 3 Union and 1 Crown meter owned by the town of Milton, and one detector meter owned by the city of Malden, are regularly used for measuring the water supplied to the various cities and towns.

The nine pressure regulating valves in the distribution mains, for reducing the pressure of the water supplied to Nahant, Revere, Swampscott and Winthrop and to portions of Chelsea, East Boston and Hyde Park have given satisfactory service.

Recording pressure gages have been maintained at 21 stations on the distribution system and tables in the Appendix show the hydraulic grade at 18 of these stations as determined from the charts.

A complete stock of pipes, specials and other materials and supplies required for maintaining and operating the pipe lines has been kept on hand at the Glenwood pipe yard in Medford and at the Chestnut Hill pipe yard in Brighton, and an auto truck equipped with a gate-operating attachment has been stationed at each yard with men on duty ready to operate them in case of emergency any time during the day or night.

CONSUMPTION OF WATER

During the year 45,420,493,000 gallons of water were furnished from the Metropolitan Water Works to the 18 cities and towns supplied. This is equivalent to an average daily consumption of 124,099,700 gallons and for the estimated population of 1,300,000 is at the rate of 95 gallons per capita per day, a decrease of 2 gallons per capita since 1923. While business conditions tended to reduce the quantity of water used for business purposes, the dry summer and fall tended to increase the use of water for lawn sprinkling and agricultural purposes. Under the circumstances a reduction of 2 gallons per capita per day in the total consumption is probably due to the further installation of meters on service pipes and other measures taken in some places to reduce waste.

The population, consumption of water and per cent of services metered in the Metropolitan Water District as supplied in 1924, and for the period from 1890 to 1924, inclusive, are shown graphically by the accompanying diagram.

The average daily consumption of water in each of the municipalities in the Metropolitan Water District supplied during 1923 and 1924 as measured by the Metropolitan Water Works meters is as follows:—

	Estimated Popula- tion, 1924	AVERAGE DAILY CONSUMPTION.				
		1923		1924		Decrease in Gallons
		Gallons	Gallons per Capita	Gallons	Gallons per Capita	
Arlington . . .	23,600	1,251,100	58	1,395,000	59	143,900 ¹
Belmont . . .	13,850	865,700	66	887,200	64	21,500 ¹
Boston . . .	787,620	88,932,800	113	87,680,900	111	1,251,900
Chelsea . . .	46,600	3,646,100	80	3,551,700	76	94,400
Everett . . .	44,100	4,309,200	100	4,491,500	102	182,300 ¹
Lexington . . .	6,990	440,700	64	448,000	64	7,300 ¹
Malden . . .	53,350	2,857,100	55	2,859,900	54	2,800 ¹
Medford . . .	46,150	2,563,400	58	2,441,400	53	122,000
Melrose . . .	19,390	1,268,400	66	1,247,400	64	21,000
Milton . . .	11,450	452,500	41	537,000	47	84,500 ¹
Nahant . . .	1,550	189,900	127	195,800	126	5,900 ¹
Quincy . . .	53,260	4,175,700	80	4,352,400	82	176,700 ¹
Revere . . .	31,000	2,255,800	75	2,293,300	74	37,500 ¹
Somerville . . .	100,660	8,008,500	81	7,760,100	77	248,400
Stoneham . . .	8,230	615,200	75	600,900	73	14,300
Swampscott . . .	8,400	658,500	79	731,100	87	72,600 ¹
Watertown . . .	26,100	1,804,300	72	1,657,100	63	147,200
Winthrop . . .	17,700	950,100	55	969,000	55	18,900 ¹
District . . .	1,300,000	125,245,000	97	124,099,700	95	1,145,300

¹ Increase.

The consumption by districts in 1924 as compared with 1923 is as follows: —

	Gallons per Day, 1924	Decrease from 1923	
		Gallons per Day	Percent- age
Southern low-service district, embracing the low-service district of Boston with the exception of Charlestown and East Boston	41,179,800	405,500	.98
Northern low-service district, embracing the low-service districts of Arlington, Charlestown, Chelsea, East Boston, Everett, Malden, Medford and Somerville	27,809,100	824,900	2.88
Southern high-service district, embracing Quincy and Watertown, the high-service districts of Boston and portions of Belmont and Milton	42,173,500	380,900	.90
Northern high-service district, embracing Melrose, Nahant, Revere, Stoneham, Swampscott and Winthrop and the high-service districts of Chelsea, East Boston, Everett, Malden, Medford and Somerville	10,787,000	379,000 ¹	3.64 ¹
Southern extra high-service district, embracing the higher portions of Hyde Park, Milton and West Roxbury	1,007,700	12,100 ¹	1.22 ¹
Northern extra high-service district, embracing Lexington and the higher portions of Arlington and Belmont	1,142,600	74,900 ¹	7.02 ¹
Totals	124,099,700	1,145,300	.91

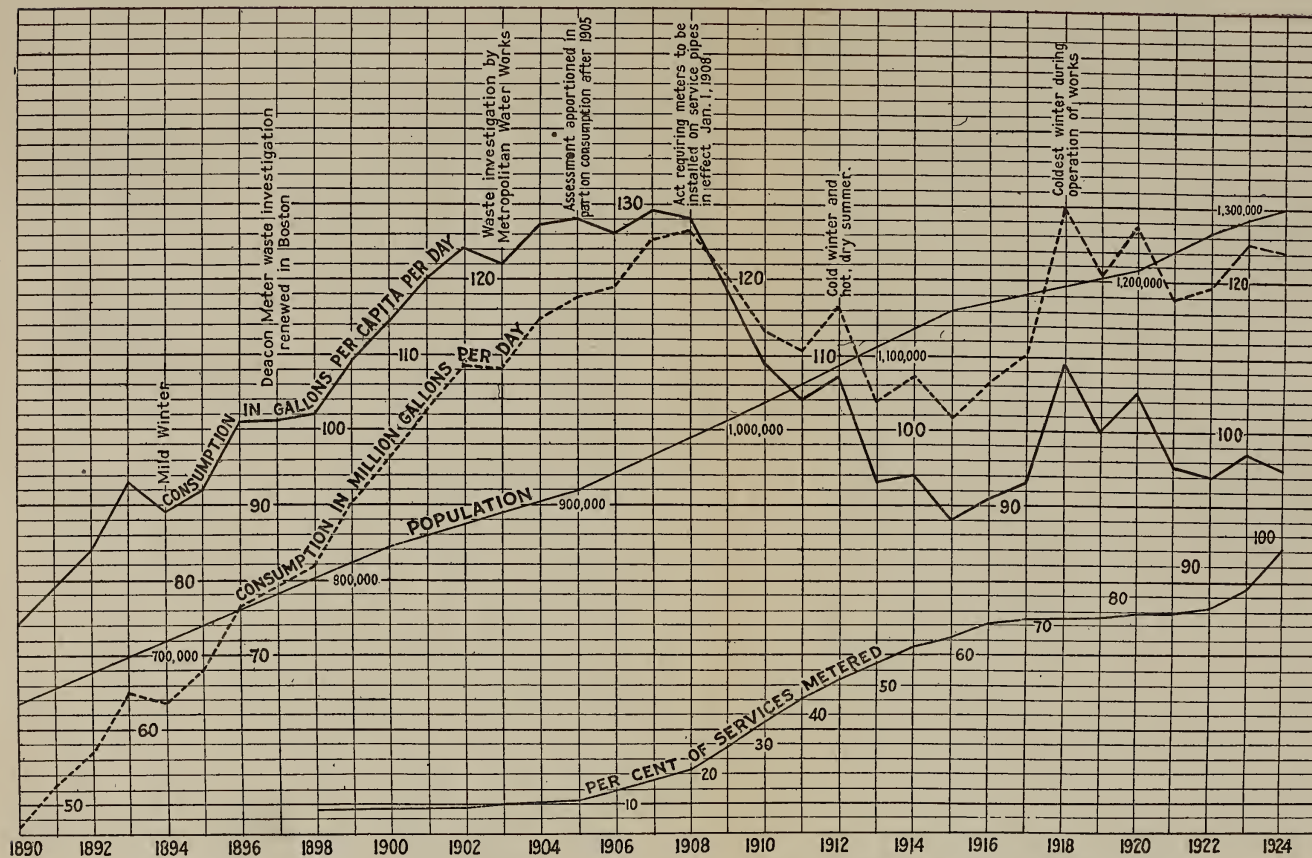
¹ Increase.

During June, July, August, October, November and December 98,762,000 gallons of water was furnished to the city of Newton, through the emergency connection on Ward Street near Hammond Street, or 85,262,000 gallons in excess of the quantity the city is entitled to take free of charge under the agreement made in 1900 when the Waban Hill Reservoir was purchased from the city. It was at first arranged that the city should replace this water with an equal quantity from its works but by later agreement the city will pay the sum of \$5,001.47 for the water obtained from the Metropolitan Water Works in excess of the capacity of the Waban Hill Reservoir.

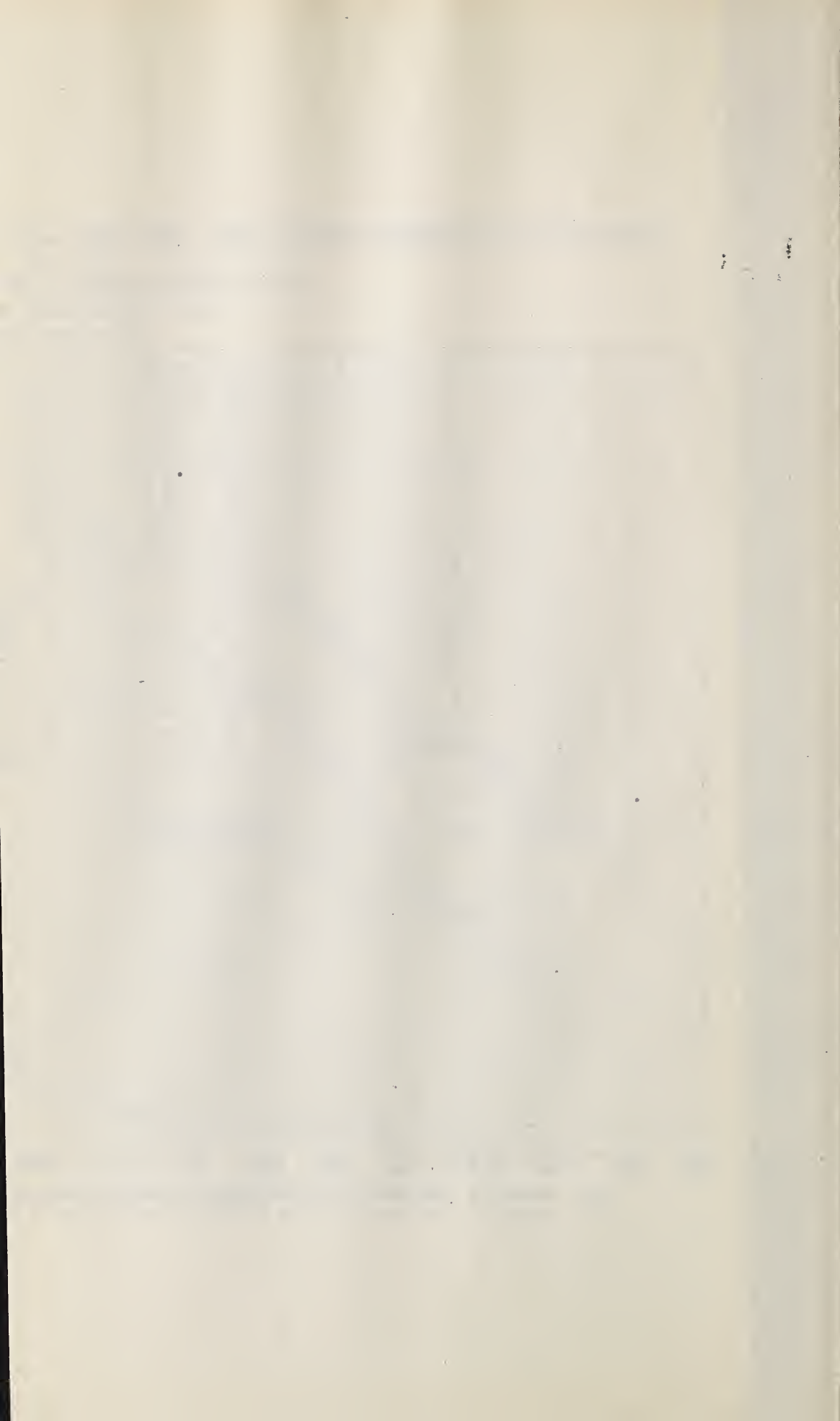
Installation of Meters on Service Pipes

Information regarding the installation of meters on service pipes by the municipalities supplied with water from the Metropolitan Water Works is given in the accompanying table.

POPULATION, CONSUMPTION OF WATER AND PER CENT OF SERVICES METERED
IN THE
METROPOLITAN WATER DISTRICT
AS SUPPLIED IN 1924
FROM 1890 TO 1924



Note: Estimated population and consumption per capita given on diagram published in annual reports 1916 to 1919 inclusive have been revised and are here shown in accordance with 1920 census.



CITY OR TOWN	Services in Use Dec. 31, 1907	Services equipped with Meters Dec. 31, 1907	Number of Meters required to be set on Old Services Each Year	Old Services in Use Dec. 31, 1924	Old Services equipped with Meters Dec. 31, 1924	Meters set on Old Services 1908-1924, inclusive	Number of Meters required to be set on old Services 1908-1924, inclusive	New Services installed and in Use Dec. 31, 1924 ¹	New Services equipped with Meters Dec. 31, 1924 ¹	Total Services in Use Dec. 31, 1924	Total Services equipped with Meters Dec. 31, 1924	Per Cent of Services metered Dec. 31, 1924
Arlington	1,929	835	55	1,786	1,786	951	935	2,518	2,518	4,304	4,304	100.00
Belmont	792	792	—	751	751	—	—	2,124	2,124	2,875	2,875	100.00
Boston	93,942	5,190	4,276	72,705	68,071	62,881	63,936 ²	17,725	17,032	90,430	85,103	94.11
Chelsea	6,603	1,792	140	3,334 ³	3,327	2,340	2,380	2,144	2,136	5,478	5,463	99.73
Everett	5,161	116	252	5,122	4,440	4,324	4,284	1,300	1,300	6,422	5,740	89.38
Lexington	730	80	32	730	730	650	544	985	985	1,715	1,715	100.00
Malden	7,055	6,780	14	6,665	6,665	—	238	1,775	1,730	8,440	8,395	99.47
Medford	4,378	582	179	4,014	4,014	3,432	3,043	3,877	3,877	7,891	7,891	100.00
Melrose	3,429	1,058	119	3,427	3,427	2,369	2,023	1,357	1,357	4,784	4,784	100.00
Milton	1,285	1,285	—	1,240	1,240	—	—	1,590	1,590	2,830	2,830	100.00
Nahant	410	90	16	407	352	262	272	547	544	954	896	93.92
Quincy	6,091	1,480	230	5,564	5,320	3,840	3,910	7,337	6,435	12,901	11,755	91.12
Revere	2,875	158	138	2,827	2,154	1,996	2,346	2,562	2,560	5,389	4,714	87.47
Somerville	11,662	3,446	411	11,358	10,448	7,002	6,987	2,831	2,831	14,189	13,279	93.59
Stoneham	1,331	30	65	1,320	1,320	1,290	1,105	622	622	1,942	1,942	100.00
Swampscott	1,307	892	21	1,245	1,245	353	357	972	972	2,217	2,217	100.00
Watertown	1,886	1,886	—	1,860	1,860	—	—	2,221	2,221	4,081	4,081	100.00
Winthrop	2,074	70	100	2,019	2,019	1,949	1,700	1,178	1,178	3,197	3,197	100.00
Totals	152,940	26,562	6,048	126,374	119,169	93,639	94,060	53,665	52,012	180,039	171,181	95.08

¹ The number of new services installed and the number of new services equipped with meters do not always agree for the reason that service pipes are installed but meters are not set until the buildings are permanently occupied.

² Boston: Number of meters required to be set each year on old services, 4,438 for 1908, 1909 and 1910; reduced to 4,225 in 1911 on account of reduction in number of old services and increased to 4,276 after 1911 on account of unmetered services acquired by the annexation of Hyde Park. Boston exempt from setting meters on old services in 1917 and 1918. (Chapter 269, Special Acts of 1917, and Chapter 45, Special Acts of 1918.)

³ Chelsea: 2,810 services destroyed during conflagration in April, 1908; 987 metered services remained after conflagration.

WATER SUPPLIED OUTSIDE OF METROPOLITAN WATER DISTRICT

During the year 812,571,615 gallons of water were supplied from the Metropolitan Water Works for use outside the Metropolitan Water District, for which \$23,589.40 was charged, as follows:—

PLACES SUPPLIED	Number of Days on which Water was Supplied	Total Quantity (Gallons)	Average Quantity (Gallons per Day)	Amount Charged
City of Worcester	52	240,200,000	—	\$9,608 00
Westborough State Hospital	366	71,722,000	196,000	2,151 66
Town of Framingham:				
From Sudbury Aqueduct prior to November 9	313	260,531,885	1,242,942	6,252 77
From filter-gallery at Farm Pond	313	128,902,918		246 54
From Sudbury Aqueduct after November 9	53	65,481,812		2,619 27
Portion of Town of Saugus	321	27,646,000	—	1,550 00
United States Government:				
Peddock's Island	—	18,087,000	—	1,161 16

FILTRATION OF WATER

The experiments begun in 1923 to obtain information concerning the improvement by filtration of the portion of the water supply not now used for consumption because of its objectionable color have been continued so as to cover all conditions that arise during the entire year. General plans and estimates are now being prepared for filtration works for the waters of the 47 square miles on the South Sudbury Watershed which have not been used for water supply since 1912. The total expenditure from the \$25,000 appropriation for this work to January 1, 1925 is \$14,180.37 leaving \$10,819.63 available for completion of the work.

WATER WORKS STATISTICS

Statistics relating to the operation of the Metropolitan Water Works for the year 1924 are given in tables in the Appendix.

Respectfully submitted,

WILLIAM E. FOSS, *Director and Chief Engineer.*

BOSTON, January 2, 1925.

REPORT OF DIRECTOR AND CHIEF ENGINEER OF SEWERAGE DIVISION

DAVIS B. KENISTON, *Commissioner, Metropolitan District Commission.*

DEAR SIR:—The following report of the operations of the Metropolitan Sewerage Works for the year ending December 31, 1924, is respectfully submitted:—

ORGANIZATION

The Director and Chief Engineer has charge of the design and construction of all new works, and of the maintenance and operation of all the works controlled by the Metropolitan District Commission for removing sewage from the twenty-six municipalities which comprise the Metropolitan Sewerage Districts.

The following assistants have been employed during the year:—

Henry T. Stiff, Senior Assistant Engineer, in charge of office and drafting room and of construction work.

Charles F. Fitz, Assistant Engineer, in charge of maintenance studies and records.

Ralph W. Loud, Assistant Engineer, in charge of survey work and field work in connection with the New Mystic Sewer and Mill Brook Valley Sewer construction.

George W. Wood, Assistant Engineer, in charge of survey for sewer location in Mill Brook Valley, Arlington.

Thomas L. Whelan, Superintendent, North Metropolitan Sewerage District.

Arthur F. F. Haskell, Superintendent, South Metropolitan Sewerage District.

In addition to the above, the maximum number of engineering and other assistants employed during the year was 14, which includes 2 instrumentmen, 3 inspectors, 2 draftsmen, 5 rodmen and engineering assistants and 2 stenographers.

METROPOLITAN SEWERAGE DISTRICTS

AREAS AND POPULATIONS

During the year no changes have been made in the extent of the Metropolitan Sewerage Districts.

The populations of the districts, as given in the following table, are based on the census of 1920.

Table showing Ultimate Contributing Areas and Present Estimated Populations within the Metropolitan Sewerage Districts, as of December 31, 1924.

CITY OR TOWN		Area (Square Miles)	Estimated Population
North Metropolitan District	Arlington	5.20	24,050
	Belmont	4.66	14,050
	Boston (portions of)	3.45	99,350
	Cambridge	6.11	114,650
	Chelsea	2.24	46,800
	Everett	3.34	44,300
	Lexington ¹	5.11	5,370
	Malden	5.07	53,680
	Medford	8.35	46,820
	Melrose	3.73	19,550
	Reading	9.82	8,050
	Revere	5.86	31,500
	Somerville	3.96	100,830
	Stoneham	5.50	8,260
	Wakefield	7.65	14,110
	Winchester	5.95	11,240
	Winthrop	1.61	17,950
	Woburn	12.71	17,250
		100.32	677,810
South Metropolitan District	Boston (portions of)	24.96	296,130
	Brookline	6.81	41,680
	Dedham ¹	9.40	11,810
	Milton	12.59	11,620
	Newton	16.88	49,110
	Quincy	12.56	53,880
	Waltham	13.63	33,030
	Watertown	4.04	26,650
	Wellesley	9.89	7,210
		110.76	531,120
Totals		211.08	1,208,930

¹Part of Town.

METROPOLITAN SEWERS

SEWERS PURCHASED AND CONSTRUCTED AND THEIR CONNECTIONS

During the year there have been 1.233 miles of Metropolitan sewers built within the sewerage districts, so that there are now 120.370 miles of Metropolitan sewers. Of this total, 9.642 miles of sewers, with the Quincy Pumping Station, have been purchased from cities and towns of the districts. The remaining 110.728 miles of sewers and other works have been constructed by the Metropolitan Boards.

The locations, lengths and sizes of these sewers are given in the following tables, together with other data referring to the public and special connections with the systems:—

NORTH METROPOLITAN SEWERAGE SYSTEM

Location, Length and Sizes of Sewers, with Public and Special Connections

CITY OR TOWN	Size of Sewers	Length in Miles	Public Connections, December 31, 1924	SPECIAL CONNECTIONS	
				Character or Location of Connection	Number in Operation
Boston:—					
Deer Island .	4' 0" to 9' 0"	1.653	4	- -	-
East Boston .	9' 0" to 1' 0"	5.467	25	Shoe factory Middlebrook Wool-combing Co.	1 1
Charlestown .	6' 7"×7' 5" to 1' 0"	3.292	15	Navy Yard Private building Club House	9 1 1
Winthrop . .	9' 0"	2.864	14	Fire department station Private building Bakery Rendering works Metropolitan Water Works blow-off	1 1 1 1 1
Chelsea . . .	8' 4"×9' 2" to 15"	5.230	14	Chelsea Water Works blow-offs Naval Hospital U. S. Lighthouse Service Metropolitan Water Works blow-off Cameron Appliance Co. Shultz-Goodwin Co. Andrews-Wasgatt Co. National Metallic Bed Co. Linoide Co. Factory New England Structural Co.	1 2 1 1 1 1 1 1 1 2 1
Everett . . .	8' 2"×8' 10" to 4' 8"×5' 1"	2.925	8	Metropolitan Water Works blow-off Private buildings Private buildings Factory Railroad station Park Department bath-house Harvard dormitories Slaughter house City Hospital Street railway machine shop Private building Factory building	1 219 ² 128 ⁴ 1 1 1 2 1 3 1 1 1
Lexington . .	- -	-	1	- -	-
Malden . . .	4' 6"×4' 10" to 1' 0"	5.844 ¹	35	Metropolitan Water Works blow-off Private buildings Private buildings Factory Railroad station Park Department bath-house Harvard dormitories Slaughter house City Hospital Street railway machine shop Private building Factory building	1 1 1 1 1 1 2 1 3 1 1 1
Melrose . . .	4' 6"×4' 10" to 10"	6.099 ³	39	Metropolitan Water Works blow-off Private buildings Private buildings Factory Railroad station Park Department bath-house Harvard dormitories Slaughter house City Hospital Street railway machine shop Private building Factory building	1 1 1 1 1 1 2 1 3 1 1 1
Cambridge . .	5' 2"×5' 9" to 1' 3"	7.209	48	Metropolitan Water Works blow-off Private buildings Private buildings Factory Railroad station Park Department bath-house Harvard dormitories Slaughter house City Hospital Street railway machine shop Private building Factory building	1 1 1 1 1 1 2 1 3 1 1 1

¹ Includes 1.84 miles of sewer purchased from the city of Malden.

² Mostly buildings connected with sewers formerly belonging to city of Malden but later purchased by the Metropolitan Sewerage Commission in accordance with Chapter 215 of the Acts of 1898 and by the Metropolitan Water and Sewerage Board in accordance with Chapter 512 of the Acts of 1911 and made parts of the North Metropolitan Sewerage System.

³ Includes .736 of a mile of sewer purchased from the city of Melrose.

⁴ Mostly buildings connected with a sewer formerly belonging to the city of Melrose but later purchased by the Metropolitan Sewerage Commission in accordance with Chapter 414 of the Acts of 1896 and with a sewer extension built in accordance with Chapter 436 of the Acts of 1897 by the Metropolitan Sewerage Commission as an outlet for part of the town of Stoneham and made parts of the North Metropolitan Sewerage System.

NORTH METROPOLITAN SEWERAGE SYSTEM — *Concluded*
Location, Length and Sizes of Sewers, with Public and Special Connections — Con.

CITY OR TOWN	Size of Sewers	Length in Miles	Public Connections, December 31, 1924	SPECIAL CONNECTIONS	
				Character or Location of Connection	Number in Operation
Somerville . . .	6' 5"×7' 2" to 10" . . .	3.577	13	Tannery	1
				Slaughterhouses (3)	1
				Carhouse	1
				Somerville Water Works blow-off	1
				Street railway power house	1
				Stable	1
				Rendering works	1
				Railroad scale pit	1
				Private building	1
				Armory building	1
Medford	4' 8"×5' 1" to 10'	6.000	26	Private buildings	9
				Stable	1
				Police substation	1
				Tanneries	6
				Private buildings	10
				Gelatine factory	1
				Watch-hand factory	1
				Stable	1
				Railroad station	2
				Felt works	1
Winchester . . .	4' 6" to 1' 3'	10.420	28	Town Hall	1
				Bay State Saw & Tool Co.	1
				Whitney Machine Co.	1
				Metropolitan Sewerage Division	1
				—	—
				Glue factory	4
				Private buildings	1
				Private buildings	176 ²
				Railroad station	1
				Car house	3
Belmont ³	—	—	3	Post office	1
				—	—
Wakefield . . .	3' 0" to 2' 0"×2' 3"	0.703	1	—	—
Revere	4' 0" to 15"	0.136	3	—	—
Reading	—	0.055	1	—	—
		68.513 ⁴	335	615	

¹ Includes 2.631 miles of sewer purchased from the town of Arlington.

² Mostly buildings connected with a sewer formerly belonging to the town of Arlington but later purchased by the Metropolitan Sewerage Commission in accordance with Chapter 520 of the Acts of 1897 and made a part of the North Metropolitan Sewerage System.

³ The Metropolitan Sewer extends but a few feet into the town of Belmont.

⁴ Includes 2.787 miles of Mystic Valley Sewer in Medford and Winchester, running parallel with the Metropolitan Sewer.

SOUTH METROPOLITAN SEWERAGE SYSTEM

Location, Length and Sizes of Sewers, with Public and Special Connections

CITY OR TOWN	Size of Sewers	Length in Miles	Public Connections, December 31, 1924	SPECIAL CONNECTIONS	
				Character or Location of Connection	Number in Operation
Boston: — Back Bay	6' 6" to 3' 9"	1.500 ¹	16	Tufts Medical School	1
				Private house	1
				Administration Building, Boston Park Department	1
				Simmons College Buildings	1
				Art Museum	2
				Prince District Elementary School	1
				Private buildings	1
Brighton	5' 9"×6' 0" to 12"	6.010 ²	15	Abattoir	3

¹ Includes .355 of a mile of sewer purchased from the city of Boston

² Includes .446 of a mile of pipe and concrete sewers built for the use of the city of Boston; also .026 of a mile of sewer purchased from the town of Watertown.

SOUTH METROPOLITAN SEWERAGE SYSTEM—Concluded
Location, Length and Sizes of Sewers, with Public and Special Connections—Con.

CITY OR TOWN	Size of Sewers	Length in Miles	Public Connections, December 31, 1924	SPECIAL CONNECTIONS	
				Character or Location of Connection	Number in Operation
Dorchester . .	3'×4' to 2' 6"×2' 7" . .	2.870 ¹	13	Chocolate works Machine shop Paper Mill Private buildings Edison Electric Company Station Mattapan Paper Mills Private buildings Fairview Cemetery buildings	2 1 1 3 1 2 2 1
Hyde Park . .	10' 7"×11' 7" to 4' 0"×4' 1" . .	4.527	18	—	—
Roxbury . .	6' 6"×7' to 4' 0"	1.430	—	—	—
West Roxbury	9' 3"×10' 2" to 12"	7.643	17	Caledonia Grove buildings Parental School Lutheran Evangelical Church Private buildings Private buildings Private buildings Dedham Carpet Mills	1 1 1 6 2 1 1
Brookline . .	6' 6"×7' 0" to 8"	2.540 ²	12	—	—
Dedham . .	4'×4' 1" to 2' 9"×3'	5.012	8	Private buildings Private buildings Dedham Carpet Mills	2 1 1
Hull ³ . .	60" pipe	0.750	—	—	—
Milton . .	11'×12' to 8"	3.600	24	Private buildings	2
Newton . .	4' 2"×4' 9" to 1' 3"	2.911	8	Private houses Metropolitan Water Works blow-off Squantum schoolhouse	7 1 1
Quincy . .	11' 3"×12' 6" to 24" pipe . .	7.392	17	—	—
Waltham . .	3' 6"×4' 0"	0.001	1	Factories Stanley Motor Carriage Co. Knights of Pythias building Walker-Gordon Co.	2 1 1 1
Watertown . .	4' 2"×4' 9" to 12"	0.750 ⁴	7	—	—
Needham ³ . .	2' 0"×2' 3" to 2' 3"×2' 6" . .	4.921	—	—	—
Wellesley ⁵ . .	—	—	1	—	—
		51.857	157		53

¹ Includes 1.24 miles of sewer purchased from the city of Boston.
² Includes .158 of a mile of pipe sewer built for the use of the town of Brookline.
³ Hull and Needham are not parts of the Metropolitan Sewerage District.
⁴ Includes .025 of a mile of sewer purchased from the town of Watertown.
⁵ The Metropolitan Sewer extends but a few feet into the town of Wellesley.

Information relating to areas, populations, local sewer connections and other data for the Metropolitan sewerage districts appears in the following table:—

North Metropolitan Sewerage District

Area (Square Miles)	Estimated Total Population	Miles of Local Sewer Connected	Estimated Population Contributing Sewage	Ratio of Contributing Population to Total Population (Per cent)	CONNECTIONS MADE WITH METROPOLITAN SEWERS	
					Public	Special
100.32	677,810	839.59	630,310	93.0	335	615

South Metropolitan Sewerage District

110.76	531,120	741.63	418,710	78.8	157	53
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Both Metropolitan Sewerage Districts

211.08	1,208,930	1,581.22	1,049,020	86.8	492	668
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Of the estimated gross population of 1,208, 930 on December 31, 1924, 1,049,020 representing 86.8 per cent, were on that date contributing sewage to the Metropolitan sewers, through a total length of 1,581.22 miles of local sewers owned by the individual cities and towns of the districts.

These sewers are connected with the Metropolitan Systems by 492 public and 668 special connections. During the current year there has been an increase of 32.06 miles of local sewers connected with the Metropolitan Systems, and 7 public and 12 special connections have been added.

CONSTRUCTION

NORTH METROPOLITAN SEWERAGE SYSTEM

NEW MYSTIC SEWER

The construction in the North Metropolitan Sewerage District, authorized by Chapter 529 of the Acts of 1922, was completed during this year. The work was divided into two sections, 71 and 72 of the New Mystic Sewer. A contract for the construction of Section 71 was described in last year's report. The contract for Section 72 was awarded to Antony Cefalo, some particulars of which are as follows:—

Date of contract No. 16 (Sewerage Division), January 17, 1924.

Name of contractor, Antony Cefalo.

Length of section, 3,476 linear feet.

Average depth of sewer in trench, 10 feet, 6 inches.

Dimensions of concrete sewer, 30 inches by 31 inches.

Length of concrete sewer, 2,359 linear feet.

Diameter of pipe sewer, 20 inches.

Length of pipe sewer, 1,117 linear feet.

Assistant Engineer in charge of construction, Ralph W. Loud.

Work was started on this section January 21, 1924, and was carried on to completion on August 4, 1924. At Station 23 + 59 was built a special controlling structure in which was left an opening for the sewer which has been projected for the Aberjona River Valley in the city of Woburn. The work authorized by the above chapter, together with the previously existing sewer line, will furnish ample sewerage accommodations for this district for many years.

MILL BROOK VALLEY SEWER, ARLINGTON

Chapter 65, Resolves of 1923, authorized a survey and study for a sewer in Mill Brook Valley, Arlington, in accordance with the requirements of Chapter 520, Acts of 1897. Chapter 116, Acts of 1924, authorized the construction of this work. This sewer will extend from West Medford at Warren Street through public streets and private lands to Forest Street in Arlington. It will be divided into four sections. The lower section, numbered 77, extends from Warren Street, West Medford, through High Street, to near the Mystic River. A contract for this section was awarded to Anthony Baruffaldi Company, some particulars of which are as follows:—

Date of contract No. 18 (Sewerage Division), July 3, 1924.

Name of contractor, Anthony Baruffaldi Co.

Length of section, 3,100 linear feet.

Maximum depth of excavation in trench, 26 feet.

Average depth of excavation in trench, 17 feet.

Dimensions of concrete sewer, 36 inches by 42 inches.

Length of concrete sewer, 2,573 linear feet.

Dimensions of cast-iron pipe sewer, 2 lines of 30-inch pipe.

Length of cast-iron pipe sewer, 527 linear feet.

Length of local 8-inch sewer built to accommodate dwellings on north side of High Street, 570 linear feet.

Assistant Engineer in charge of construction, Ralph W. Loud.

Work was begun on this section July 23, 1924, and has been continued at two openings. At the present time, 1,020 feet of 36-inch by 42-inch sewer and 527 feet of double line of 30-inch cast-iron pipe and 480 feet of 8-inch local sewer have been constructed. The nature of the ground at the lower end of this section is such that it has been necessary to use 3-inch matched sheeting driven about 5 feet below the underdrain. By so doing, it has been possible to construct this sewer without serious difficulty from the very fine sand encountered. At Station 25 + 20 the structure passes the old Mystic water supply conduit which conducted water

from upper Mystic Lake to the Mystic Pumping Station. It was necessary to reduce the cross-section of the conduit at this point. The shallow depth from Station 22 + 20 to Station 27 + 60 necessitated the construction of a local 8-inch sewer to accommodate the dwellings whose drainage had been cut off by the construction of the main sewer. This discharges into a manhole in the local Medford Sewer opposite Station 27 + 70.

MILL BROOK VALLEY SEWER, SECTION 78

Plans and specifications for the construction of this section are nearly completed. It is expected that this section will be placed under contract early in the season.

MAINTENANCE

SCOPE OF WORK AND FORCE EMPLOYED

The maintenance of the Metropolitan Sewerage System includes the operating of 8 pumping stations, the Nut Island Screen-house and 120.371 miles of Metropolitan sewers, receiving the discharge from 1,581.22 miles of town and city sewers at 492 points, together with the care and study of inverted siphons under streams and in the harbor.

At present the permanent maintenance force consists of 173 men, of whom 106 are employed on the North System and 67 on the South System. These are subdivided as follows: North Metropolitan System, 67 engineers and other employees in the pumping stations and 39 men, including foremen, on maintenance, care of sewer lines, buildings and grounds: South Metropolitan System, 41 engineers and other employees in the pumping stations and 26 men, including foremen, on maintenance, care of sewer lines, buildings and grounds.

The regular work of this department, in addition to the operation of the pumping stations, has consisted of routine work of cleaning and inspecting sewers and siphons, caring for tide gates, outfall sewers, regulators and overflows, measuring flow in sewers, inspection of connections to the Metropolitan sewers, and the care of pumping stations and other buildings, grounds and wharves.

In addition to these regular duties other work has been done by the maintenance employees in this department as follows:—

DEER ISLAND PUMPING STATION

Attention has been called in previous reports to the condition of the wharf at Deer Island. No appropriation has been allowed for the erection of a new wharf. Either extensive repairs must be made or a new wharf constructed. This wharf is in an unsafe condition and the coal run is barely usable.

Pumping Unit No. 3 at this station has been extensively repaired. These repairs consist of a cast-iron segment ring which has been placed inside of the pump casing and secured thereto by bolts. This was done to take up the wear between the impeller wheel and the casing. A new bronze sleeve was put on the 10-inch shaft and a steady bearing was placed immediately above the pump casing. This bearing became necessary because of the weakening of the quarter box bearing due to corrosion. A new 48-inch check valve disc was placed in the discharge pipe of this pump.

EAST BOSTON PUMPING STATION

Pumping engine No. 3 at this station was repaired similarly to the one at Deer Island, mentioned in the preceding paragraph. A new piston and piston rod fitted with Tripp metallic packing was installed in the high pressure cylinder of this unit.

The lot owned by the Commonwealth situated on the Chelsea side of Chelsea Creek was enclosed by a woven Toncan iron fence six feet in height. This was erected by C. A. Gates & Company.

CHARLESTOWN PUMPING STATION

The No. 3 engine at this station received extensive repairs. These consisted of a cast-iron segment ring placed inside of the casing at the lower side of the impeller wheel. This was secured by bolts to the casing and was put in to replace the

wear and corrosion which had taken place. A new steady bearing was installed above the pump case together with a new bronze sleeve on the 10-inch shaft. The 48-inch check valve disc in the discharge pipe of No. 3 pump broke in service and was renewed.

Pump Unit No. 2 also received extensive repairs. These consisted of the installation of a new impeller wheel and repairs to the casing. A new steady bearing was installed above the pump casing together with a new bronze sleeve on the 6-inch shaft. All the repairs on pump No. 2 were completed so that it was put in service on November 14, 1924.

The 8-inch salt water exhaust pipe from the condensers of pumping units No. 1 and No. 2 had been in place since the station was built in 1894. It had become so badly corroded that it was necessary to renew a part of it.

The work of renewing the screen guides, as mentioned in last year's report, has been completed and new screens have been installed.

The fender piling and caplog at the easterly side of the station had become so badly rotted it was necessary to renew the structure. This was done by the William L. Miller Company.

WINCHESTER STOCK YARD

During the year a new locker building constructed of concrete blocks, with asphalt shingled roof, having a length of 115 feet and a width of 27 feet has been constructed. This building contains an office, men's room and lockers, repair shop, garage and two storage rooms. It is heated by a low-pressure steam boiler and contains toilets.

WARD STREET PUMPING STATION

At the time of the construction of the Ward Street Sewerage Pumping Station, it was designed that a third pump of the triple-expansion plunger type should be at some time added to the pumping plant. The station was originally put into service in 1904. Since that time the design of centrifugal pumps has been so improved that it has been considered best to substitute one of this type for the plunger pump originally intended. Foundation was placed at the time of the construction of the building to receive the plunger pump. It has been possible, however, to adapt the new type of pump to the existing foundation.

The cost of the centrifugal unit as compared with the plunger type unit is at present probably in the ratio of about 1 to 6. Not only has this saving in capital been effected but the upkeep of this type of pump is very small as compared with the plunger type and the difference in overall maintained efficiency will not be great.

Early in the year a 50,000,000 gallon pumping unit was received at this station. This consists of a 540 HP. uniflow engine built by the Nordberg Company and a centrifugal pump built by the Morris Pump Works. This engine and pump with condenser and appurtenances were ordered through the firm of Starkweather & Broadhurst of Boston to be delivered but not erected. The placing of foundation and erection of the pump together with the designing and installing of piping and other accessory appliances have all been performed by the maintenance force. Sewage will be used for condensing purposes which will be accomplished by a Schutte-Koerting eductor condenser. At the present time the engine, primary heater and condenser pump, discharge pipe, suction pipe, steam pipe and most of the auxiliary piping are in position.

Some particulars of this engine and pump are as follows:—

Engine

Total weight, 130,000 pounds.

Maximum revolutions per minute, 150.

Diameter of main shaft, 16 inches.

Horse Power, 540.

Guaranteed steam per HP. hour, 13.9 lbs.

Diameter of cylinder, 24 inches.

Diameter of piston rod, 6½ inches.

Stroke, 40 inches.

Diameter of fly wheel, 12 feet.
 Weight of fly wheel, 35,000 lbs.
 Guaranteed duty on steam basis, 103,000,000.

Pump

Total weight: 70,000 pounds.
 Diameter of impeller wheel, 92 inches.
 Diameter of suction, 40 inches.
 Diameter of discharge, 36 inches.
 Diameter of shaft, 10½ inches.
 Lift of suction of pump, 14 feet.
 Total dynamic head, 45 feet.

This engine is protected from back water by a Schutte-Koerting steam operated, butterfly valve and by a Morton Vacuum Breaker and Water Check Valve. A Reilly primary heater has been installed in the exhaust line. The unit may be operated non-condensing, if necessary. It is expected that this engine will be put into operation early in the coming year.

A Sturtevant economizer was installed at this station to replace the Green economizer which had been in use since 1904.

NUT ISLAND SCREEN-HOUSE

In addition to the regular service at this station during the year, 4,483 pounds of bronze castings have been made here for use in the several pumping stations.

The copper gutter on this station originally consisted of 16-ounce material. This had been on twenty years and was so badly corroded it was no longer possible to keep it tight. A new gutter has been constructed consisting of 24-ounce copper. Work was done by a firm of roofers in conjunction with our own force.

The mechanic in charge of this station has been employed during most of the year in supervising the erection of the new 50,000,000 gallon pumping unit at Ward Street Pumping Station.

A fence around the yard at Prospect Street, Hough's Neck, has been erected consisting of woven Toncan iron having a height of five feet. This was erected by C. A. Gates & Company.

The building and stable at the stock yard at Prospect Street were repainted.

A new 40 horsepower Lathrop engine was installed in the boat used for harbor work.

GASOLINE IN PUBLIC SEWERS

During the year the usual precautions have been maintained against the introduction of gasoline into the Metropolitan Sewers. An inspector has been employed who covers both North and South Metropolitan Sewerage Districts. His duties are to see that all newly constructed garages or other gasoline using establishments are supplied with a proper gasoline separator and also to see that these separators are kept in working condition.

During the year 1924 a larger number of permits for garages and places where gasoline is used was issued than in any previous year, namely, 2,458. Each of these permits necessitates an examination by our inspector. Many of them, however, are attended to through the mails and do not require a personal visit. Visits are made, however, to all locations where a connection is to be made with the public sewer system and to such places as do not respond to the return postal cards sent out. During the year 85 such places were connected with the sewers that empty into the Metropolitan Systems. At the present time, there are, according to our records, 1,270 garages and other establishments where gasoline is used connected with the Sewerage Systems which discharge into the Metropolitan sewers.

This system of inspection has given satisfactory results. Occasionally odors of gasoline are detected in the sewers but the amount is not sufficient to be dangerous and the situation appears to be well in hand.

NORTH METROPOLITAN SEWERAGE SYSTEM

Table showing Cities and Towns delivering Sewage to this System; Approximate Miles of Sewers connected; Estimated Populations and Areas now contributing; Total Areas ultimately to contribute, and Present Populations on Such Areas; Ratios of Present Contributing Areas to Ultimate Areas, and Ratios of Populations now contributing to Present Total Populations.

[Populations estimated as of December 31, 1924]

CITIES AND TOWNS	Miles of Local Sewers Connected	Separate or Combined	Number of Connections with Local Sewers	Estimated Number of Persons Served by Each House Connection ¹	Estimated Population Now Contributing Sewage	Estimated Present Total Population	Estimated Area Now Contributing Sewage	Area Ultimately to Contribute Sewage	Ratio of Contributing Population to Present Total Population		Ratio of Contributing Area to Ultimate Area	
									Per Cent.	Per Cent.	Per Cent.	Per Cent.
Boston (Deer Island)	0.70	Separate	—	—	750 ²	750	—	—	—	—	—	—
Winthrop	32.93	Separate	3,302	5.35	17,670	17,950	1.40	1.61	98.4	87.0	87.0	87.0
Boston (East Boston)	34.51	Separate and combined	5,246	12.30	64,530	64,860	1.20	2.18	99.5	55.0	55.0	55.0
Chelsea	32.02	Separate and combined	4,520	10.10	45,650	46,800	1.18	2.24	97.5	52.7	52.7	52.7
Everett	49.98	Separate and combined	5,506	7.50	41,300	44,300	2.08	3.34	93.2	62.3	62.3	62.3
Malden	69.98	Separate	7,927	6.50	51,530	53,080	3.22	5.07	96.0	63.5	63.5	63.5
Melrose	41.52	Separate	3,826	4.60	17,600	19,550	1.97	3.73	90.0	52.8	52.8	52.8
Boston (Charlestown)	21.79	Separate and combined	5,511	6.05	33,340	33,740	0.67	1.27	98.8	52.8	52.8	52.8
Cambridge	160.48	Separate and combined	17,449	6.45	113,840	114,650	5.06	6.11	99.3	82.8	82.8	82.8
Somerville	102.90	Separate and combined	16,839	5.95	100,190	100,830	3.54	3.96	99.4	89.4	89.4	89.4
Medford	70.92	Separate	7,436	6.20	46,100	46,820	3.49	8.35	98.5	41.8	41.8	41.8
Winechester	34.90	Separate	2,238	5.00	11,190	11,240	1.70	5.95	99.6	28.6	28.6	28.6
Woburn	19.53	Separate	1,470	5.60	8,230	17,250	1.09	12.71	47.7	8.6	8.6	8.6
Stoneham	13.92	Separate	1,117	4.80	5,360	8,260	0.75	5.50	64.9	13.6	13.6	13.6
Arlington	40.44	Separate	3,516	6.10	21,450	24,050	2.19	5.20	89.2	42.1	42.1	42.1
Belmont	29.88	Separate	1,915	6.40	12,810 ³	14,050	1.57	4.66	91.2	33.7	33.7	33.7
Wakefield	17.28	Separate	1,081	5.10	5,510	14,110	0.73	7.65	39.1	9.5	9.5	9.5
Lexington	7.25	Separate	238	4.50	1,070	5,370	0.27	5.11	19.9	5.3	5.3	5.3
Revere	49.32	Separate	4,422	6.80	30,070	31,500	2.39	5.86	95.4	40.8	40.8	40.8
Reading	9.34	Separate	531	4.00	2,120	8,050	0.43	9.82	26.3	4.4	4.4	4.4
Totals	839.59	—	94,290	6.7	630,310	677,810	34.93	100.32	93.0	34.8	34.8	34.8

¹ Estimated from Assessors' statement of the number of houses in each city or town on April 1, 1924, and the population from census of 1920.

² Estimated by Superintendent of the institution on Deer Island.

³ Including 2 connections with McLearn Hospital, having an estimated population of 556.

SOUTH METROPOLITAN SEWERAGE SYSTEM

Table showing Cities and Towns delivering Sewage to this System; Approximate Miles of Sewers connected; Estimated Populations and Areas now contributing; Total Areas ultimately to contribute, and Present Populations on Such Areas; Ratios of Present Contributing Areas to Ultimate Areas, and Ratios of Populations now contributing to Present Total Populations.

[Populations estimated as of December 31, 1924.]

CITIES AND TOWNS	Miles of Local Sewers Connected	Separate or Combined	Number of Connections with Local Sewers	Estimated Number of Persons Served by Each House Connection ¹	Estimated Population now Contributing Sewage	Estimated Present Total Population	Estimated Area Contributing Sewage	Area Ultimately to Contribute Sewage	Ratio of Contributing Population to Present Population	Ratio of Contributing Area to Ultimate Area
							Sq. Miles	Sq. Miles	Per Cent.	Per Cent.
Boston (Back Bay)	27.38	Separate and combined	2,049	17.60	36,060	36,250	1.16	1.61	99.5	72.00
Boston (Brighton)	66.60	Separate and combined	4,646	10.45	48,550	48,820	3.28	3.74	99.4	87.7
Brookline	76.18	Separate and combined	5,744	7.20	41,360	41,680	3.67	6.81	99.2	53.9
Newton	144.91	Separate	9,346	5.15	48,130	49,110	8.39	16.88	98.0	49.7
Watertown	51.00	Separate	3,725	7.05	26,260	26,650	2.45	4.04	98.5	60.6
Waltham	48.46	Separate	4,286	7.55	32,360	33,030	2.51	13.63	98.0	18.4
Boston (Dorchester)	62.20	Separate and combined	6,609	9.80	64,770 ²	96,090 ²	2.72	4.89	67.42	55.6
Milton	20.45	Separate and combined	1,467	4.60	6,750 ²	11,620 ²	1.07	12.59	58.12	8.5
Boston (Hyde Park)	37.38	Separate and combined	2,670	7.25	19,360	19,430	1.74	4.57	99.6	38.1
Dedham	18.19	Separate	1,053	4.90	5,160	11,810 ³	0.91	9.40	43.7	9.7
Boston (Roxbury) ⁴	—	—	—	—	—	48,490 ²	—	1.23	—	—
Boston (West Roxbury)	68.18	Separate and combined	4,907	6.80	35,880 ^{2,5}	47,050 ²	2.98	8.92	76.32	33.4
Quincy	99.43	Separate	8,902	5.80	51,630	53,880	4.00	12.56	95.8	31.8
Wellesley	21.27	Separate	609	4.00	2,440	7,210	1.10	9.89	33.8	11.1
Totals	741.63	—	56,013	7.5	418,710	531,120	35.98	110.76	78.8	32.5

¹ Estimated from Assessors' statement of the number of houses in each city or town on April 1, 1924, and the population from census of 1920.

² Parts of Dorchester, Milton, Roxbury and West Roxbury which are situated within the South Metropolitan Sewerage System limits are tributary at present to Boston main drainage works.

³ Part of town not included in Metropolitan Sewerage District.

⁴ At present connected with Boston main drainage system.

⁵ Including connection with institutions at Austin Farm, having an estimated population of 2,510.

BOTH METROPOLITAN SEWERAGE SYSTEMS

Table showing Areas delivering Sewage to both Systems; Approximate Miles of Sewers connected; Estimated Populations and Areas now contributing; Total Areas ultimately to contribute, and Present Populations on Such Areas. Ratios of Present Contributing Areas to Ultimate Areas, and Ratios of Populations now contributing to Present Total Populations.

[Population estimated as of December 31, 1924]

SYSTEMS	Miles of Local Sewers Connected	Separate or Combined	Number of Connections with Local Sewers	Estimated Number of Persons Served by Each House Connection	Estimated Population Now Contributing Sewage	Estimated Present Total Population	Estimated Area Now Contributing Sewage	Area Ultimately to Contribute Sewage	Ratio of Contributing Population to Present Total Population	Ratio of Contributing Area to Ultimate Area
North Metropolitan	839.59	Separate and combined	94,290	6.7	630,310	677,810	Sq. Miles 34.93	Sq. Miles 100.32	Per Cent. 93.0	Per Cent. 34.8
South Metropolitan	741.63	Separate and combined	56,013	7.5	418,710	531,120	35.98	110.76	78.8	32.5
Totals	1,581.22	-	150,303	7.0	1,049,020	1,208,930	70.91	211.08	86.8	33.6

PUMPING STATIONS

CAPACITIES AND RESULTS

NORTH METROPOLITAN SYSTEM

Deer Island Pumping Station

At this station are four submerged centrifugal pumps with impeller wheels 8.25 feet in diameter, driven by triple-expansion engines of the Reynolds-Corliss type.

Contract capacity of 1 pump: 100,000,000 gallons, with 19-foot lift.

Contract capacity of 3 pumps: 45,000,000 gallons each, with 19-foot lift.

Average duty for the year: 54,100,000 foot pounds.

Average quantity raised each day: 74,900,000 gallons.

Maximum quantity raised per day: 126,600,000 gallons.

East Boston Pumping Station

At this station are four submerged centrifugal pumps, with impeller wheels 8.25 feet in diameter, driven by triple-expansion engines of the Reynolds-Corliss type.

Contract capacity of 1 pump: 100,000,000 gallons with 19-foot lift.

Contract capacity of 3 pumps: 45,000,000 gallons each, with 19-foot lift.

Average duty for the year: 70,700,000 foot pounds.

Average quantity raised each day: 72,900,000 gallons.

Maximum quantity raised per day: 124,600,000 gallons.

Charlestown Pumping Station

At this station are three submerged centrifugal pumps, two of them having impeller wheels 7.5 feet in diameter, the other 8.25 feet in diameter. They are driven by triple-expansion engines of the Reynolds-Corliss type.

Contract capacity of 1 pump: 60,000,000 gallons with 8-foot lift.

Contract capacity of 2 pumps: 22,000,000 gallons each, with 11-foot lift.

Average duty for the year: 46,400,000 foot pounds.

Average quantity raised each day: 41,600,000 gallons.

Maximum quantity raised per day: 67,700,000 gallons.

Alewife Brook Pumping Station

The plant at this station consists of two 9-inch Andrews commercial centrifugal pumps, direct connected by horizontal shafts to compound marine engines, together with a pump and engine added later. The latter consists of a specially designed engine of the vertical cross-compound type, having between the cylinders a centrifugal pump rotating on a horizontal axis.

Contract capacity of the 2 original pumps: 4,500,000 gallons each, with 13-foot lift.

Contract capacity of new pump: 13,000,000 gallons, with 13-foot lift.

Average duty for the year: 19,400,000 foot pounds.

Average quantity raised each day: 5,560,000 gallons.

Maximum quantity raised per day: 13,400,000 gallons.

Reading Pumping Station

At this station are two submerged centrifugal pumps, of 2,500,000 gallons per 24 hours, and 4,000,000 gallons per 24 hours, capacity. These operate against a maximum head of 65 feet, and are actuated by vertical shafts directly connected with 75 and 100 horsepower motors. Alternating current of 440 volts furnished by the municipal plant of the town of Reading is used.

Average quantity pumped per 24 hours: 740,000 gallons.

Maximum quantity raised per day: 980,000 gallons.

SOUTH METROPOLITAN SYSTEM
Ward Street Pumping Station

At this station are two vertical, triple-expansion pumping engines, of the Allis-Chalmers type, operating reciprocating pumps, the plungers of which are 48 inches in diameter with a 60-inch stroke. A 50,000,000 gallon centrifugal pumping unit is being installed.

Contract capacity of 2 pumps: 50,000,000 gallons each, with 45-foot lift.
Average duty for the year: 69,900,000 foot pounds.
Average quantity raised each day: 34,200,000 gallons.
Maximum quantity raised per day: 66,100,000 gallons.

Quincy Pumping Station

The plant at this station consists of one compound condensing Deane duplex piston pumping unit and one Lawrence centrifugal pump driven by a Sturtevant compound condensing engine and one Morris centrifugal pump driven by a Morris compound condensing engine.

Contract capacity of 3 pumps: Morris centrifugal 10,000,000 gallons; Deane, 5,000,000 gallons; Lawrence centrifugal, 10,000,000 gallons.
Average duty for the year: 24,000,000 foot pounds.
Average quantity raised each day: 5,029,000 gallons.
Maximum quantity raised per day: 11,500,000 gallons.

Nut Island Screen-house

The plant at this house includes two sets of screens in duplicate actuated by small reversing engines of the Fitchburg type. Two vertical Deane boilers, 80 horsepower each, operate the engines, provide heat and light for the house, burn materials intercepted at the screens, and furnish power for the Quincy (Hough's Neck) sewage lifting station.

Average daily quantity of sewage passing screens: 60,875,000 gallons.
Maximum quantity passing screens per day: 182,000,000 gallons.

Quincy (Hough's Neck) Sewage Lifting Station

At this station are two 6-inch submerged Lawrence centrifugal pumps with vertical shafts actuated by two Sturtevant direct-current motors.
The labor and electric energy for this station are supplied from the Nut Island Screen-house, and as used at present it does not materially increase the amount of coal used at the latter station.

Average quantity raised each day: 214,000 gallons.
Maximum quantity raised per day: 472,300 gallons.

Average Daily Volume of Sewage lifted at Each of the Seven Principal Metropolitan Sewerage Pumping Stations and at the Quincy (Hough's Neck) Sewage Lifting Station during the Year, as compared with the Corresponding Volumes for the Previous Year.

PUMPING STATION	AVERAGE DAILY PUMPAGE			
	Jan. 1, 1924, to Dec. 31, 1924	Jan. 1, 1923, to Dec. 31, 1923	Increase during the Year	
	Gallons	Gallons	Gallons	Per Cent
Deer Island	74,900,000	76,200,000	1,300,000 ¹	1.7 ¹
East Boston	72,900,000	74,200,000	1,300,000 ¹	1.8 ¹
Charlestown	41,600,000	41,800,000	200,000 ¹	0.5 ¹
Alewife Brook	5,560,000	5,440,000	120,000	2.2
Reading	740,000	750,000	10,000 ¹	1.3 ¹
Quincy	5,029,000	4,990,000	39,000	0.8
Ward Street (actual gallons pumped) . . .	34,200,000	34,100,000	100,000	0.3
Quincy (Hough's Neck)sewage lifting station	214,000	218,000	4,000 ¹	1.8 ¹

¹ Decrease.

METROPOLITAN SEWERAGE OUTFALLS

The Metropolitan Sewerage Districts now have outfalls in Boston Harbor at five points, two of which may discharge sewage from the North District and three from the South District.

During the year the sewage of the North District has been discharged wholly through the outlet located near Deer Island light. The other outfall of this system is closed by a cast-iron cover which can easily be removed.

Of the outfalls of the South District two extend for a distance exceeding one mile from the shore of Nut Island, Quincy, and the third one, called an emergency outlet, extends about 1,500 feet from the same. No discharge was made through the emergency outlet during 1924.

During the year the average flow through the North Metropolitan District outfall at Deer Island has been 74,875,000 gallons of sewage per 24 hours, with a maximum rate of 126,600,000 gallons during a stormy period in August, 1924. The amount of sewage discharged in the North Metropolitan District averaged 119 gallons per day for each person, taking the estimated population of the District contributing sewage. If the sewers in this district were restricted to the admission of sewage proper only, this per capita amount would be considerably decreased.

In the South Metropolitan District an average of 60,875,000 gallons of sewage per 24 hours has passed through the screens at the Nut Island Screen-house, and has been discharged from the outfalls into the outer harbor. The maximum rate of discharge per day which occurred during a stormy period in August, 1924, was 182,000,000 gallons. The discharge of sewage through these outfalls represents the amount of sewage contributed by the South Metropolitan District, which was at the rate of 145 gallons per day per person of the estimated number contributing sewage in the District.

The daily discharge of sewage per capita is considerably larger in the South Metropolitan District than it is in the North Metropolitan District, because, owing to the large size and unused capacity of the South District High-level Sewer, more storm water is at present admitted to the sewers of this District.

Material Intercepted at the Screens

The material removed from the sewage at the screens of the North Metropolitan Sewerage Stations, consisting of rags, paper and other floating materials, has during the year amounted to 1,540.5 cubic yards. This is equivalent to 1.52 cubic feet for each million gallons of sewage pumped at Deer Island.

The material removed from the sewage at the screens of the South Metropolitan Sewerage Stations has amounted to 3,462.6 cubic yards, equal to 4.19 cubic feet per million gallons of sewage delivered at the outfall works at Nut Island.

Studies of sewage flows in the Metropolitan Sewers and siphons indicate that they are free from deposit.

FREDERICK D. SMITH,

BOSTON, January 1, 1925. *Director and Chief Engineer of Sewerage Division.*

FINANCIAL STATEMENT
PARKS DIVISION

LOAN FUNDS	Total of Loans and Receipts	Expended for Year ending Jan. 1, 1925	Total Expended to Jan. 1, 1925	Balance
Metropolitan Parks Loan . . .	\$9,291,986 77	-	\$9,262,649 13	\$29,337 64
Metropolitan Parks Loan II — General . . .	6,595,579 54	\$348 40	6,502,936 43	92,643 11
Neponset Bridge Loan . . .	900,020 00	221,440 54	876,140 78	23,879 22
Old Colony Boulevard . . .	1,753,334 62	253,947 37	309,785 74	1,443,548 88
Furnace Brook Parkway . . .	135,000 00	102,282 13	102,618 58	32,381 42
Cottage Farm Bridge Loan . . .	1,100,000 00	9,838 91	101,641 03	998,358 97
Western Ave. Bridge Loan . . .	275,000 00	216,547 73	217,263 84	57,736 16
Arsenal St. Bridge Loan . . .	175,000 00	4,690 51	5,396 99	169,603 01
River St. Bridge Loan . . .	275,000 00	10,909 27	11,134 77	263,865 23
Mass. Ave. Bridge Loan . . .	600,000 00	355,920 95	355,920 95	244,079 05
No. Traffic Route Loan . . .	1,800,000 00	5,723 56	5,723 56	1,794,276 44
Charles River Basin Loan . . .	4,509,368 91	60 00	4,472,862 22	36,506 69

MAINTENANCE EXPENDITURES, JANUARY 1, 1924 TO JANUARY 1, 1925

Metropolitan Parks Maintenance Fund, General:

Totals

General Expense	\$232,706 68
Blue Hills Reservation	92,625 29
Stony Brook Reservation	10,473 07
Neponset River Reservation	2,375 28
Quincy Shore Reservation	19,599 42
Middlesex Fells Reservation	99,006 54
Mystic River Reservation	15,428 33
Revere Beach Reservation	60,645 31
Lynn Shore Reservation	21,482 06
Winthrop Shore Reservation	9,392 02
Cambridge Parkway	48,762 85
Charles River Upper Division	65,229 30
Riverside Recreation Grounds	5,212 85
Beaver Brook Reservation	3,534 50
Pensions	16,138 84

\$702,612 34*Metropolitan Parks Maintenance Fund, Specials:*

Clearing woods	691 00
Band concerts	19,152 66
Investigation, Harvard Bridge	2,288 08
Investigation, Lynn Woods Parkway	500 00
Westerly Border Road, W. R. P.	28,894 16
Nahant Beach Playground	2,707 04
Alewife Brook Parkway Grading	2,481 89
Eliot Circle, Revere St. Roadway	27,787 37

Metropolitan Parks Maintenance Fund — Boulevards, General:

General Expense	\$118,417 83
Blue Hills Parkway	12,807 70
Neponset River Parkway	1,556 24
Furnace Brook Parkway	16,103 42
Hammond Pond Parkway	3,490 50
West Roxbury Parkway	3,062 73
Dedham Parkway	1,318 65
Old Colony Parkway	729 77
Middlesex Fells Parkway	60,059 69
Mystic Valley Parkway	35,857 10
Lynn Fells Parkway	6,502 54
Middlesex Fells Roads	16,051 92
Woburn Parkway	6,144 89
Alewife Brook Parkway	12,481 38
Revere Beach Parkway	47,229 42
Nahant Beach Parkway	9,626 50
Lynnway	12,211 83
Winthrop Parkway	4,982 41
Fresh Pond Parkway	4,438 58
Neponset River Bridge	11,648 01

\$384,721 11*Metropolitan Parks Maintenance Fund — Boulevards, Special:*

Repairs to Cottage Farm Bridge	\$1,726 62
Sidewalks in Blue Hills Parkway	1,006 88
Boulevard, Hyde Park District	8,507 05
Sidewalks, Charles River Road	2,208 22

Charles River Basin Maintenance 184,050 74*Metropolitan Parks Maintenance Fund, Nantasket* 75,301 22*Metropolitan Parks Maintenance Fund, Wellington Bridge* 15,144 17*Bunker Hill Maintenance* 9,693 12

Metropolitan Parks Expense Fund:

Receipts, year ending January 1, 1925	\$233,339 42	
Receipts, previous to January 1, 1924	2,411,150 68	
	<u> </u>	\$2,644,490 10
Expenditures, year ending January 1, 1925	\$121,167 98	
Expenditures, previous to January 1, 1924	2,211,799 20	
	<u> </u>	2,332,967 18
Balance		\$311,522 92

WATER AND SEWERAGE DIVISIONS

The financial abstract of the receipts, disbursements, assets and liabilities of the Metropolitan District Commission, Water and Sewerage Divisions, for the State fiscal year, beginning with December 1, 1922, and ending with November 30, 1924 was, in accordance with the requirements of Section 100, Chapter 92 of the General Laws, presented to the General Court in January last, and a copy of this financial abstract is printed as Appendix No. 4.

As required by said section a detailed statement of its doings for the calendar year 1924, in relation to the Metropolitan Water and Sewerage Works, is herewith presented.

WATER WORKS — CONSTRUCTION

(1) WATER LOANS — RECEIPTS AND PAYMENTS

Total loans authorized to January 1, 1925		\$45,685,000 00
Receipts from the sales of property applicable to the construction and acquisition of works:		
For the period prior to January 1, 1924	\$285,253 32	
For the year ending December 31, 1924	<u>3,011 88</u>	288,265 20
Receipt from the town of Swampscott for admission to district (St. 1909, c. 320)		<u>90,000 00</u>
		\$46,063,265 20
Total amount authorized to January 1, 1925		
Amounts approved by Board for payments out of Water Loan Fund:		
Payments prior to January 1, 1924	\$44,144,436 64	
Approved for year ending December 31, 1924	<u>855,532 77</u>	44,999,969 41
Amount authorized but not expended January 1, 1925		\$1,063,295 79

(2) TOTAL WATER DEBT, DECEMBER 31, 1924

Water Loan Outstanding, Sinking Fund and Debt

Bonds issued by the Treasurer of the Commonwealth:		
Sinking fund bonds (3 and 3½ per cent)		\$41,398,000 00
Serial bonds (3½, 4 and 4¼ per cent)		<u>3,149,000 00</u>
		\$44,547,000 00
Total bond issue to December 31, 1924		
Serial bonds paid prior to January 1, 1924	\$366,000 00	
Serial bonds paid in 1924	<u>56,000 00</u>	422,000 00
Total bond issue outstanding December 31, 1924		\$44,125,000 00
Gross Water Debt		\$44,125,000 00
Sinking fund December 31, 1924		<u>21,396,342 90</u>
Net water debt December 31, 1924		\$22,728,657 10
A decrease for the year of \$173,961 04.		

(3) METROPOLITAN WATER LOAN AND SINKING FUND, DECEMBER 31, 1924

YEAR	Authorized Loans	Bonds issued (Sinking Fund)	Bonds issued (Serial Bonds)	Sinking Fund
1895	\$27,000,000	\$5,000,000	—	\$226,286 05
1896	—	2,000,000	—	699,860 70
1897	—	6,000,000	—	954,469 00
1898	—	4,000,000	—	1,416,374 29
1899	—	3,000,000	—	1,349,332 97
1900	—	1,000,000	—	1,573,619 72
1901	13,000,000	10,000,000	—	1,662,426 95
1902	—	3,500,000	—	2,256,803 81
1903	—	1,500,000	—	2,877,835 59
1904	—	2,500,000	—	3,519,602 92
1905	—	650,000	—	4,207,045 69
1906	500,000	1,350,000	—	4,897,822 62
1907	—	—	—	5,643,575 69
1908	398,000	—	—	6,419,283 28
1909	900,000	398,000	—	7,226,262 31
1910	80,000	500,000	—	8,089,902 91
1911	212,000	—	\$200,000	8,953,437 44
1912	600,000	—	190,000	9,829,356 80
1913	108,000	—	—	10,767,701 68
1914	—	—	258,000	11,533,453 45
1915	—	—	490,000	12,491,245 25
1916	—	—	66,000	13,268,199 36
1917	—	—	150,000	14,036,278 88
1918	115,000	—	—	14,870,834 84
1919	67,000	—	161,000	15,904,545 14
1920	2,705,000	—	34,000	16,953,165 15
1921	—	—	—	18,147,014 21
1922	—	—	500,000	19,230,940 55
1923	—	—	100,000	20,278,381 86
1924	—	—	1,000,000	21,396,342 90
	\$45,685,000	\$41,398,000	\$3,149,000	—

(4) WATER ASSESSMENT, 1924

The following water assessment was made by the Treasurer of the Commonwealth upon the various municipalities: —

Sinking fund requirements	\$190,306 67
Serial bonds	\$85,000 00
Less premium	12,680 00
	<hr/>
Interest	72,320 00
Maintenance:	1,523,744 23
Appropriated by Legislature	776,320 00
Less balance on hand	13,263 86
	<hr/>
	763,056 14
Total water assessment for 1924	<hr/>
	\$2,549,427 04

In accordance with Section 26, Chapter 92 of the General Laws, the proportion to be paid by each city and town is based one-third in proportion to their respective

valuations and the remaining two-thirds in proportion to their respective water consumption for the preceding year, except that but one-fifth of the total valuation and no consumption has been taken for the city of Newton, as it has not been supplied with water from the Metropolitan Works.

The division of the assessment for 1924 was as follows:—

CITIES AND TOWNS	Assessment	CITIES AND TOWNS	Assessment
Arlington . . .	\$29,239 38	Newton . . .	\$7,413 74
Belmont . . .	18,812 22	Quincy . . .	86,652 47
Boston . . .	1,829,973 63	Revere . . .	43,289 27
Chelsea . . .	66,810 29	Somerville . . .	142,275 86
Everett . . .	75,924 49	Stoneham . . .	11,505 56
Lexington . . .	10,557 19	Swampscott . . .	15,360 30
Malden . . .	57,571 16	Watertown . . .	36,204 42
Medford . . .	52,026 17	Winthrop . . .	20,408 15
Melrose . . .	26,475 80		
Milton . . .	14,738 24		\$2,549,427 04
Nahant . . .	4,188 70		

(5) SUPPLYING WATER TO CITIES AND TOWNS OUTSIDE OF DISTRICT AND TO WATER COMPANIES

Sums have been received during the year 1924 under the provisions of the Metropolitan Water Act, for water furnished, as follows:—

Town of Framingham	\$7,653 49
City of Revere (on account of water furnished to a portion of the town of Saugus for the year 1923)	650 00
United States Government (for Peddock's Island)	872 36
Westborough State Hospital	2,397 04
City of Worcester	1,520 00
	<hr/>
	\$13,092 89

The sums so received prior to March 23, 1907, were annually distributed among the cities and towns of the district, but since that date, in accordance with the provisions of Chapter 238 of the Acts of 1907, the sums so received have been paid into the sinking fund.

(6) EXPENDITURES FOR THE DIFFERENT WORKS

The following is a summary of the expenditures made in the various operations for the different works: —

CONSTRUCTION AND ACQUISITION OF WORKS	For the Year ending December 31, 1924
Administration applicable to all parts of the construction and acquisition of the works	\$2,826 76
Distribution System:	
Northern high service:	
Section 50 (reinforcement of the northern high-service pipe lines) . .	\$475 94
Additional pumping machinery at Spot Pond Pumping Station . .	69,240 85
Southern high service:	
Additional pumping machinery at Chestnut Hill Pumping Station of the southern high service	2,957 55
Northern extra high service:	
Arlington Reservoir in Arlington, Mass.	46,456 62
Weston Aqueduct Supply Mains, Section 1	70,639 35
Weston Aqueduct Supply Mains, Section 9	329,634 33
Weston Aqueduct Supply Mains, Section 10	278,285 42
Weston Aqueduct Supply Mains, Section 11	51,751 08
Weston Aqueduct Supply Mains, Section 12	1,189 58
	850,630 72
Stock — pipes, valves, castings, etc., purchased and sent first to storage yards, and later transferred, as needed, to the various parts of the work: —	
Amount received	\$62,388 96
Transferred from storage yards to the various sections of the work and included in costs of special works	60,313 67
	2,075 29
	855,532 77
Amount charged from beginning of work to January 1, 1924	44,144,436 64
Total for construction and acquisition of works to January 1, 1925 .	\$44,999,969 41
MAINTENANCE AND OPERATION	For the Year ending December 31, 1924
Administration	\$8,614 56
General supervision	27,730 25
Taxes and other expenses	49,884 46
Filtration of water supply	10,646 95
Wachusett Department:	
Superintendence	\$11,861 95
Reservoir	27,138 00
Forestry	17,405 94
Protection of supply	7,450 92
Buildings and grounds	7,989 23
Wachusett Dam	11,568 48
Wachusett Aqueduct	8,266 02
Clinton Sewerage System:	
Pumping station	2,871 21
Sewers, screens and filter beds	9,900 22
Sanitary inspection	850 49
Swamp drainage	13,906 60
Power Plant	11,615 34
Wachusett-Sudbury power transmission line	97 94
Payments under industrial accident law and special benefit appropriations	290 29
	131,212 63
Sudbury Department:	
Superintendence, Framingham Office	\$14,521 99
Ashland Reservoir	4,861 15
Hopkinton Reservoir	3,441 13
Whitehall Reservoir	4,658 70
Framingham Reservoirs Nos. 1, 2 and 3	12,534 82
Sudbury Reservoir	16,738 98
Lake Cochituate	10,591 50
Marlborough Brook filters	6,124 18
Pegan filters	7,045 62
Sudbury and Cochituate watersheds	2,290 29
Sanitary inspection	4,102 20
Cochituate Aqueduct	4,459 74
Sudbury Aqueduct	8,316 51
Weston Aqueduct	9,921 81
Forestry	8,516 37
Power Plant	11,124 57
Protection of water supply in Aqueducts	2 00
Payments under industrial accident law and special benefit appropriations	118 00
	\$129,369 56

MAINTENANCE AND OPERATION	For the Year ending December 31, 1924	
Distribution Department:		
Superintendence	\$10,255	02
Pumping service:		
Superintendence	8,707	55
Payments under industrial accident law and special benefit appropriations		741 86
Arlington Pumping Station, pumping service	15,469	39
Chestnut Hill low-service pumping station, pumping service No. 2	92,858	04
Chestnut Hill high-service pumping station, pumping service No. 1	36,703	28
Spot Pond Pumping Station, pumping service	31,138	72
Hyde Park Pumping Station, pumping service	11,957	35
Arlington stand pipe	4	50
Chelsea Reservoir	47	76
Bear Hill Reservoir	324	06
Chestnut Hill Reservoir and grounds	24,660	65
Fells Reservoir	1,616	04
Forbes Hill Reservoir	2,207	99
Mystic Lake, conduit and pumping station	2,866	22
Mystic Reservoir	1,343	00
Waban Hill Reservoir	993	09
Weston Reservoir	7,056	18
Spot Pond	11,843	70
Buildings at Spot Pond	2,535	65
Pipe lines:		
Low service	50,165	54
Northern high service	12,681	07
Northern extra high service	287	01
Southern high service	10,081	26
Southern extra high service	275	85
Supply pipe lines	2,963	80
Buildings at Chestnut Hill Reservoir	8,606	89
Chestnut Hill pipe yard	3,394	07
Glenwood pipe yard and buildings	3,958	42
Stables	12,614	42
Venturi meters	1,563	82
Measurement of water	4,591	59
Arlington Pumping Station, building and grounds	450	66
Hyde Park Pumping Station, building and grounds	1,002	62
Fisher Hill Reservoir	3,153	55
Bellevue Reservoir	661	97
Arlington Reservoir	1,740	75
Payments under industrial accident law and special benefit appropriations	650	78
Stock	13,347	17
Total for maintaining and operating works	395,521 29	
	\$752,979 70	

(7) DETAILED FINANCIAL STATEMENT UNDER METROPOLITAN WATER ACT

The Commissioner herewith presents, in accordance with the requirements of the Metropolitan Water Act, a detailed statement of the expenditures and disbursements, receipts, assets and liabilities for the year 1924.

(a) Expenditures and Disbursements

The total amount of the expenditures and disbursements on account of construction and acquisition of works for the year beginning January 1, 1924, and ending December 31, 1924, was \$855,532.77 and the total amount from the time of the organization of the Metropolitan Water Board, July 19, 1895, to December 31, 1924 has been \$44,999,969.41.

For maintenance and operation the expenditures for the year were \$752,979.70.

The salaries of the commissioners, and the other expenses of administration, have been apportioned to the construction of the works and to the maintenance and operation of the same and appear under each of those headings.

The following is a division of the expenditures according to their general character:—

GENERAL CHARACTER OF EXPENDITURES		For the Year ending December 31, 1924
CONSTRUCTION OF WORKS AND ACQUISITION BY PURCHASE OR TAKING		
<i>Administration</i>		
Clerks and stenographers		\$2,654 58
Stationery and printing		66 37
Postage, express and telegrams		105 81
		<hr/>
		\$2,826 76
<i>Engineering</i>		
Chief Engineer		\$1,525 06
Principal assistant engineers		6,239 90
Engineering assistants		18,819 40
Inspectors		12,812 10
Architects		3,000 00
Railroad and street car travel		1,218 38
Wagon hire		60
Stationery and printing		242 85
Postage, express and telegrams		4 00
Engineering and draughting instruments and tools		12 84
Engineering and draughting supplies		967 32
Unclassified supplies		45
Miscellaneous expenses		117 23
		<hr/>
		44,960 13
<i>Construction</i>		
Preliminary work:		
Advertising		\$119 40
Contracts, Distribution System:		
The Atlantic Works, Contract 39, for furnishing water valves		28,098 00
The Atlantic Works, Contract 40, for furnishing automatic air valves		1,742 58
Bryne & Co., Contract 31, for laying water pipes on Section 1 (in part) of the Weston Aqueduct Supply Mains in Weston		24,292 28
Crane Construction Co., Inc., Contract 32, for constructing masonry tower on Arlington Heights		35,799 83
C. & R. Construction Co., Contract 44, for laying water pipes on Section 10 of the Weston Aqueduct Supply Mains, in Waltham		251,858 77
James Driscoll & Son Co., Contract 42, for building engine foundation and making alterations at Spot Pond Pumping Station		9,957 90
T. A. Gillespie Co., Contract 37, for laying water pipes on Section 9 of the Weston Aqueduct Supply Mains in Weston and Waltham		307,228 89
T. A. Gillespie Co., Contract 47, for laying water pipes on Section 11 of the Weston Aqueduct Supply Mains in Waltham, Belmont and Arlington		43,540 40
Fred A. Houdlette & Son, Inc., Contract 43, for furnishing cast-iron frames and covers, for gate chambers		1,861 05
Keasbey & Mattison Co., Contract 38, for furnishing and applying non-heat-conducting covering at Chestnut Hill Pumping Station No. 1 and Spot Pond Pumping Station		2,207 00
Lumsden & Van Stone Co., Contract 46, for piping for new engine at Spot Pond Pumping Station		5,874 00
Harvey L. Maney, Contract 15, for constructing reservoir foundation on Arlington Heights		3,018 35
Smith & Lovett Co., Contract 36, for constructing and erecting galleries and railings for economizers at Chestnut Hill Pumping Station No. 1 and Spot Pond Pumping Station		1,265 00
U. S. Cast Iron Pipe & Foundry Co., Contract 41, for furnishing cast-iron water pipes		862 57
Warren Foundry & Pipe Co., Contract 45, for furnishing cast-iron water pipes and special castings		25,536 69
Worthington Pump & Machinery Corp., Contract 35, for building and erecting pumping engine at Spot Pond Pumping Station		34,500 00
		<hr/>
		777,643 31
Amount carried forward		<hr/>
		\$825,549 60

GENERAL CHARACTER OF EXPENDITURES	For the Year ending December 31, 1924
<i>Amount brought forward</i>	\$825,549 60
<i>Construction — Con.</i>	
Additional work:	
Labor	\$10,092 51
Traveling	1,265 00
Rent	70 00
Freight and express	75 37
Tools, machinery, appliances and hardware supplies	258 73
Electrical supplies	652 40
Castings, ironwork and metals	5,871 86
Iron pipe and valves	2,124 64
Paint and coating	159 64
Fuel, oil and waste	70 37
Lumber and field buildings	366 18
Sand, gravel and filling	875 00
Municipal and corporation work	6,547 21
Unclassified supplies	795 52
Miscellaneous expenses	97 91
<i>Real Estate</i>	
Legal and expert:	
Legal services	\$12 47
Appraisers	175 00
Conveyancing expenses	23 36
Settlements made by Board	210 83 450 00
<i>Amount charged from beginning of work to January 1, 1924</i>	\$855,532 77 44,144,436 64
<i>Total amount of construction expenditures to January 1, 1925</i>	\$44,999,969 41
<i>MAINTENANCE AND OPERATION OF WORKS</i>	
Administration: —	
Commissioners	\$2,500 00
Secretary and assistants	3,535 00
Rent	572 06
Repairs of buildings	68 69
Fuel	75 96
Lighting	73 28
Care of building	431 09
Postage	90 24
Printing, stationery, and office supplies	838 36
Telephones	98 57
Traveling expenses	20 00
Miscellaneous expenses	311 31
General supervision:	\$8,614 56
Chief engineer and assistants	\$20,367 48
Rent	1,716 16
Repairs of building	206 13
Fuel	227 93
Lighting	219 84
Care of building	1,292 10
Postage	158 15
Express and telegrams	313 37
Printing, stationery and office supplies	1,516 73
Telephones	601 13
Traveling expenses	704 89
Miscellaneous expenses	406 34
Pumping service:	27,730 25
Superintendence	\$8,707 55
Labor	117,879 39
Fuel	56,271 54
Oil, waste and packing	2,164 91
Repairs	9,116 33
Small supplies	2,694 61
Payments under industrial accident law and special benefit appropriations	741 86
<i>Amount carried forward</i>	197,576 19 \$233,921 00

GENERAL CHARACTER OF EXPENDITURES

For the Year ending
December 31, 1924

<i>Amount brought forward</i>		\$233,921 00
Reservoirs, aqueducts, pipe lines, buildings and grounds:		
Superintendents	\$8,993 33	
Engineering assistants	19,661 32	
Sanitary inspectors	4,115 00	
Labor, pay roll	320,043 98	
Labor, miscellaneous	193 33	
Alterations and repairs of pumping stations	1,114 88	
Alterations and repairs of other buildings and structures	5,940 27	
Automobiles	17,228 50	
Brick	855 52	
Brooms, brushes and janitor's supplies	337 48	
Castings, ironwork and metals	994 27	
Cement and lime	427 25	
Drafting and photo supplies	352 97	
Electrical supplies	1,535 05	
Fertilizer and planting material	5,336 74	
Freight and express	627 88	
Fuel	4,900 47	
Gypsy moth supplies	1,611 61	
Hardware	2,672 37	
Hay and grain	746 22	
Lighting	494 59	
Lumber	2,376 65	
Machinery	768 22	
Paints and oils	1,543 98	
Pipe and fittings	1,048 22	
Postage	63 90	
Printing, stationery and office supplies	1,161 79	
Rubber and oiled goods	497 74	
Stable expenses	1,007 51	
Sand, gravel and stone	1,907 79	
Traveling expenses	3,568 35	
Telephones	1,558 81	
Teaming	3,902 10	
Tools and appliances	5,850 66	
Vehicles, harnesses and fittings	66 38	
Miscellaneous expenses	13,454 38	
Contracts:		
Charles V. Browne, Contract 20-M, for repairing roofs of Water Works buildings located in Boston, Brookline and Newton	2,648 07	
Charles V. Browne, Contract 22-M, for repairing roofs of Water Works buildings located in Stoneham and Weston	1,632 85	
R. Maitland & Son, authorized by vote of Commission, November 6, 1924, for installing bath-room and water supply outfit in George A. Twine's residence, Sterling Junction	495 00	
The P. H. Provencal Co., Contract 19-M, for constructing gate house at Whitehall Dam in Hopkinton	358 05	
Stock:		
Inspection	570 00	
Special castings	337 67	
Contract:		
U. S. Cast Iron Pipe and Fdy. Co., Contract 18-M, for cast-iron pipe and special castings	12,465 07	
Improvement and protection of water supplies	2,002 00	
Payments under industrial accident law and special benefit appropriations	1,059 07	
		458,527 29
Filtration of water supply		10,646 95
Payments in lieu of taxes		49,884 46
Total expenditures for maintenance and operation		\$752,979 70

(b) Receipts

The total amount of receipts from the operations of the Commission and from sales of property for the year beginning January 1, 1924, and ending December 31, 1924, was \$114,271.22 and the total amount from the time of the organization of the Metropolitan Water Board, July 19, 1895, to December 31, 1924, has been \$2,192,503.86. The general character of these receipts is as follows: —

GENERAL CHARACTER OF RECEIPTS	For the Year ending December 31, 1924	
Applicable to the loan fund:		
Land and buildings	\$1,381 15	
Construction tools, supplies and reimbursements	1,630 73	\$3,011 88
Applicable to payment of interest, sinking fund requirements and expenses of maintenance and operation:		
Proceeds from operations of the Board:		
Rents	\$3,846 55	
Land products	11,432 48	
Electric energy	74,859 15	
Maintenance labor, tools, supplies and reimbursements	7,979 64	
Interest and unclassified receipts	48 63	98,166 45
Applicable to the sinking fund:		
Water supplied to cities and towns, water companies and others		13,092 89
		\$114,271 22
Amount credited from beginning of work to January 1, 1924		2,078,232 64
Total receipts to January 1, 1925		\$2,192,503 86

The foregoing receipts have been credited to the various objects or works, as follows: —

SOURCES OF RECEIPTS	For the Year ending December 31, 1924	
Supplying water outside of water district		\$13,092 89
Construction and acquisition of works:		
Weston Aqueduct	\$569 46	
Distribution System	1,592 42	
Purchase of existing water works	850 00	3,011 88
Maintenance and operation of works:		
Administration	\$52 43	
General supervision	104 19	
Wachusett Aqueduct	812 70	
Wachusett Reservoir	12,848 13	
Wachusett Electric Power Plant	42,786 32	
Sudbury System	2,158 08	
Sudbury Electric Power Plant	32,106 73	
Distribution System	7,035 37	
Clinton Sewerage System	262 50	98,166 45
		\$114,271 22
Amount credited from beginning of work to January 1, 1924		2,078,232 64
Total receipts to January 1, 1925		\$2,192,503 86

(c) Assets

The following is an abstract of the assets of the water works, a complete schedule of which is kept on file in the office of the Commission: —

Office furniture, fixtures and supplies; engineering and scientific instruments and supplies; police supplies; horses, vehicles, field machinery, etc.; machinery, tools and other appliances and supplies; completed works, real estate and buildings connected therewith.

(d) Liabilities.

There are sundry bills for current expenses which have not yet been received.

Amount of Monthly Estimates, not due until Completion of Contract or until Claims are settled

NAME	Work	Amount
The Atlantic Works	Contract 40, for furnishing automatic air valves	\$307 52
Charles V. Browne	Contract 22-M, for repairing roofs of Water Works buildings located in Stoneham and Weston	288 15
Bryne & Co.	Contract 31, for laying water pipes on Section 1 (in part) of the Weston Aqueduct Supply Mains in Weston	500 00
C. & R. Construction Co.	Contract 44, for laying water pipes on Section 10 of the Weston Aqueduct Supply Mains in Waltham	27,984 31
T. A. Gillespie Co.	Contract 37, for laying water pipes on Section 9 of the Weston Aqueduct Supply Mains in Weston and Waltham	17,469 88
T. A. Gillespie Co.	Contract 47, for laying water pipes on Section 11 of the Weston Aqueduct Supply Mains in Waltham, Belmont and Arlington	4,837 82
Warren Foundry & Pipe Co.	Contract 45, for furnishing cast-iron water pipes and special castings	4,506 48
Worthington Pump & Machinery Corp.	Contract 35, for building and erecting pumping engine at Spot Pond Pumping Station	34,500 00

Settlements are pending with the following parties for land and easements taken in lands owned by them:—

New York, New Haven & Hartford Railroad Company, heirs of Ella Wood, Brayton D. Fisher, heirs of Andrew Temple, city of Medford. Georgia N. Mayberry et als., Tr., Charles W. Perkins, Tr., James E. Norton and Estate of Daniel L. Barry, Carolin R. Lawrence, Walter S. Sherman, heirs of John T. Malloy, Waltham Hospital Corporation, Mount Feake Cemetery Corporation, Boston & Maine Railroad, Estate of William Roberts, Mary A. Glynn, city of Waltham, City of Cambridge, Willam E. Peterson, Eva L. Phipps.

SEWERAGE WORKS

(1) METROPOLITAN SEWERAGE LOANS, RECEIPTS AND PAYMENTS

The loans authorized for the construction of the Metropolitan Sewerage Works, the receipts which are added to the proceeds of these loans, the expenditures for construction, and the balances available on January 1, 1925, have been as follows:—

North Metropolitan System

Loans authorized under various acts to January 1, 1925, for the construction of the North Metropolitan System and the various extensions	\$8,312,365 73
Receipts from sales of real estate and from miscellaneous sources which are placed to the credit of the North Metropolitan System:	
For the year ending December 31, 1924	\$52 66
For the period prior to January 1, 1924	87,513 38
	87,566 04
	\$8,399,931 77

Amount approved for payment from the Metropolitan Sewerage Loan Fund, North System:	
For the year ending December 31, 1924	\$182,869 51
For the period prior to January 1, 1924	7,623,759 27
	7,806,628 78

Balance, North Metropolitan System, January 1, 1925 \$593,302 99

South Metropolitan System

Loans authorized under the various acts to January 1, 1925, applied to the construction of the Charles River Valley Sewer, Neponset Valley Sewer, high-level sewer and extensions, constituting the South Metropolitan System	\$9,992,046 27
Receipts from pumping, sales of real estate and from miscellaneous sources, which are placed to the credit of the South Metropolitan System:	
For the year ending December 31, 1924	—
For the period prior to January 1, 1924	24,599 61
	24,599 61

Amount carried forward \$10,016,645 88

South Metropolitan System

<i>Amount brought forward</i>					\$10,016,645 88
Amount approved for payment from the Metropolitan Sewerage Loan Fund,					
South System:					
On account of the Charles River Valley Sewer				\$800,046 27	
On account of the Neponset Valley Sewer				911,531 46	
On account of the high-level sewer and extensions, including Wellesley extension:					
For the year ending December 31, 1924			31,849 93		
For the period prior to January 1, 1924			8,261,031 32		
			<u>z</u>	8,292,881 25	
					10,004,458 98
Balance, South Metropolitan System, January 1, 1925					12,186 90

(2) TOTAL SEWERAGE DEBT, DECEMBER 31, 1924

North Metropolitan System

Bonds issued by the Treasurer of the Commonwealth:					
Sinking fund bonds (3 and 3½ per cent)					6,563,000 00
Serial bonds (3½ and 4 per cent)					1,075,500 00
Total bond issue to December 31, 1924					\$7,638,500 00
Serial bonds paid prior to January 1, 1924				\$236,000 00	
Serial bonds paid in 1924				29,500 00	
				<u></u>	265,500 00
Total bond issue outstanding December 31, 1924					\$7,373,000 00
Gross sewerage debt					7,373,000 00
Sinking fund December 31, 1924					4,483,533 09
Net sewerage debt December 31, 1924					\$2,889,466 91
A net decrease for the year of \$370,420 26.					

South Metropolitan System

Bonds issued by the Treasurer of the Commonwealth:					
Sinking fund bonds (3 and 3½ per cent)					\$8,877,912 00
Serial bonds (4, 4½ and 5 per cent)					1,125,000 00
Total bond issue to December 31, 1924					\$10,002,912 00
Serial bonds paid prior to January 1, 1924				\$179,000 00	
Serial bonds paid in 1924				32,000 00	
				<u></u>	211,000 00
Total bond issue outstanding December 31, 1924					\$9,791,912 00
Gross sewerage debt					9,791,912 00
Sinking fund December 31, 1924					2,870,000 68
Net sewerage debt December 31, 1924					\$6,921,911 32
A net decrease for the year of \$292,429.88.					

(3) NORTH AND SOUTH METROPOLITAN LOAN AND SINKING FUNDS, DECEMBER 31, 1924

YEAR	LOANS		BONDS ISSUED (SINKING FUND)		BONDS ISSUED (SERIAL BONDS)		SINKING FUND
	North System	South System	North System	South System	North System	South System	North and South Systems
1889	\$5,000,000 00	-	-	-	-	-	-
1890	-	-	\$2,200,000	\$800,000	-	-	-
1891	-	-	368,000	-	-	-	-
1892	-	-	1,053,000	-	-	-	-
1893	-	-	579,000	-	-	-	-
1894	500,000 00	-	500,000	-	-	-	-
1895	300,000 00	500,000 00	300,000	300,000	-	-	-
1896	30,000 00	-	30,000	200,000	-	-	-
1897	85,000 00	300,000 00	80,000	300,000	-	-	-
1898	215,000 00	35,000 00	220,000	35,000	-	-	-
1899	-	4,625,000 00	-	1,025,000	-	-	\$361,416 59
1900	265,000 00	10,912 00 ¹	265,000	10,912	-	-	454,520 57
1901	-	40,000 00	-	2,040,000	-	-	545,668 26
1902	-	-	-	864,000	-	-	636,084 04
1903	500,000 00	1,000,000 00	500,000	1,736,000	-	-	754,690 41
1904	-	392,000 00	-	392,000	-	-	878,557 12
1905	-	-	-	-	-	-	1,008,724 95
1906	55,000 00	1,175,000 00	55,000	175,000	-	-	1,146,998 68
1907	-	-	-	300,000	-	-	1,306,850 30
1908	413,000 00	-	-	700,000	-	-	1,492,418 98
1909	-	-	300,000	-	-	-	1,673,784 40
1910	56,000 00	-	113,000	-	-	-	1,931,741 89
1911	6,000 00	-	-	-	-	-	2,184,674 98
1912	378,000 00	-	-	-	\$62,000	-	2,458,541 20
1913	-	-	-	-	378,000	-	2,749,337 90
1914	130,500 00	350,000 00	-	-	-	-	3,011,512 44
1915	83,000 00 ²	5,000 00	-	-	130,500	-	3,290,979 46
1916	285,000 00	40,000 00	-	-	70,000	\$355,000	3,604,657 27
1917	-	325,000 00	-	-	285,000	40,000	3,925,792 75
1918	-	-	-	-	-	325,000	4,270,205 50
1919	-	225,000 00	-	-	-	-	4,695,573 07
1920	-	100,000 00	-	-	-	225,000	5,168,524 03
1921	-	-	-	-	-	-	5,698,228 38
1922	150,000 00	80,000 00	-	-	-	100,000	6,217,099 57
1923	-	-	-	-	150,000	80,000	6,752,183 63
1924	650,000 00	-	-	-	-	-	7,353,533 77
	\$9,101,500 00 ³	\$9,202,912 00	-	-	-	-	-
	789,134 27	789,134 27	-	-	-	-	-
	\$8,312,365 73	\$9,992,046 27	\$6,563,000	\$8,877,912	\$1,075,500	\$1,125,000	-

¹ The sum of \$10,912 was appropriated to reimburse the town of Watertown for the expense of constructing the Watertown siphon.

² This amount includes \$13,000, balance of appropriation for north metropolitan maintenance under Chapter 775, Acts of 1914, which was transferred to North Metropolitan Loan Fund, under authority of Chapter 76, Resolves of 1915. No bonds to be issued, as this was cash.

³ Of this amount, \$789,134.27 was expended for the construction of the Charles River Valley Sewer, which is now included in the South Metropolitan System.

(4) SEWER ASSESSMENTS, 1924

The following sewer assessments were made by the Treasurer of the Commonwealth upon the various municipalities:

[illegible]

South Metropolitan Sewerage System

Sinking fund requirements		\$154,398 88
Serial bonds		32,000 00
Interest		349,622 53
Maintenance:		
Appropriated by Legislature	\$224,420 00	
Less balance on hand	7,235 58	
		217,184 42
Total South Metropolitan sewerage assessment		\$753,205 83

In accordance with the provision of Sections 5 and 6, Chapter 92 of the General Laws, the proportion to be paid by each city and town to meet the interest and sinking fund requirements for each year is based upon their respective taxable valuations, and to meet the cost of maintenance and operation upon their respective populations.

The divisions of the assessments for 1924 were as follows:—

North Metropolitan Sewerage System

CITIES AND TOWNS	Assessment	CITIES AND TOWNS	Assessment
Arlington	\$25,182 95	Reading	\$9,798 90
Belmont	15,966 93	Revere ¹	31,577 93
Boston	109,563 37	Somerville	102,039 97
Cambridge	154,258 49	Stoneham	8,700 20
Chelsea	47,973 43	Wakefield	15,686 36
Everett ¹	49,766 52	Winchester	20,153 59
Lexington	7,091 89	Winthrop	18,858 18
Malden ¹	54,283 34	Woburn	18,724 07
Medford	44,386 58		
Melrose	22,848 59	Total	\$756,861 29 ²

¹ Exclusive of \$3,760.01 special assessments on Everett, Malden and Revere.

South Metropolitan Sewerage System

CITIES AND TOWNS	Assessment	CITIES AND TOWNS	Assessment
Boston	\$364,836 51	Waltham	46,020 42
Brookline	98,976 16	Watertown	32,500 60
Dedham	16,141 72	Wellesley	17,027 97
Milton	20,841 60		
Newton	91,177 10	Total	\$753,205 83
Quincy	65,683 75		

(5) EXPENDITURES FOR THE DIFFERENT WORKS

The following is a summary of the expenditures made in the various operations for the different works:—

CONSTRUCTION AND ACQUISITION OF WORKS		For the Year ending December 31, 1924
NORTH METROPOLITAN SYSTEM		
North System, enlargement:		\$960 00
Administration		
New Mystic Sewer in Woburn and Winchester (Chapter 529, Acts of 1922):		
Section 71	\$49,738 28	
Section 72	65,380 10	
Real estate:		
Settlements	825 00	
Legal, conveyancing and expert	522 57	
Real estate: (sewer in Reading and Wakefield):		
Settlements	473 00	
Legal, conveyancing and expert	102 45	
		117,041 40
Mill Brook Valley Sewer in Medford and Arlington (Chapter 116, Acts of 1924):		
Section 77	\$64,842 12	
Real estate:		
Legal, conveyancing and expert	25 99	
		64,868 11
Amount charged from beginning of work to January 1, 1924		\$182,869 51 7,623,759 27
Total for North Metropolitan System to January 1, 1925		\$7,806,628 78
SOUTH METROPOLITAN SYSTEM		
High-level sewer extensions:		
Administration		\$593 00
Quincy Pumping Station and Force Main No. 2 (Chapter 529, Acts of 1922):		
Force Main No. 2	4,860 93	
Additions to Ward St. Pumping Station Plant	26,396 00	
		31,849 93
Amount charged from beginning of work to January 1, 1924		9,972,609 05
Total for South Metropolitan System to January 1, 1925		\$10,004,458 98
Total for construction, both systems.		\$17,811,087 76

MAINTENANCE AND OPERATION		For the year ending December 31, 1924
North Metropolitan System		\$334,865 94
South Metropolitan System		214,623 59
Total for maintenance, both systems		\$549,489 53

(6) DETAILED FINANCIAL STATEMENT

The Commissioner herewith presents, in accordance with the Metropolitan Sewerage Acts, an abstract of the expenditures and disbursements, receipts, assets and liabilities for the year ending December 31, 1924:—

(a) Expenditures and Disbursements

GENERAL CHARACTER OF EXPENDITURES		For the Year ending December 31, 1924
CONSTRUCTION OF WORKS AND ACQUISITION BY PURCHASE OR TAKING		
North System Enlargement		
Administration:		
Clerks and stenographers		\$960 00
Engineering:		
Chief engineer	\$1,375 01	
Engineering assistants	3,954 04	
Inspectors	1,666 99	
Traveling expenses	90 90	
Stationery, printing and office supplies	140 56	
Engineering and draughting supplies	28 14	
Miscellaneous expenses	292 93	
Amount carried forward		\$7,548 57

GENERAL CHARACTER OF EXPENDITURES		For the Year ending December 31, 1924	
Amount brought forward			\$7,548 57
North System Enlargement — Con.			
Construction:			
Advertising	\$38 50		
Labor and teaming	862 50		
Tools, machinery and appliances	1,070 16		
Brick, cement, lumber and other field supplies and expenses	23,532 68		
Contracts:			
V. J. Grande, Contract 14, for constructing Section 71 of the New Mystic Sewer in Winchester	47,043 43		
Antony Cefalo, Contract 16, for constructing Section 72 of the New Mystic Sewer in Winchester and Woburn	58,694 21		
Anthony Baruffaldi Co., Contract 18, for constructing Section 77 of the Mill Brook Valley Sewer in Medford and Arlington	41,170 45		
			172,411 93
Real estate:			
Legal, conveyancing and expert	651 01		
Settlements	1,298 00		
			1,949 01
Total for North Metropolitan System			\$182,869 51
SOUTH METROPOLITAN SYSTEM			
High-level Sewer Extensions			
Administration:			
Clerks and stenographers	\$575 00		
Stationery, printing and office supplies	18 00		
			\$593 00
Contracts:			
Bryne & Co., Contract 12, for constructing 30-inch force-main, of the high-level sewer, in Quincy, Mass.	\$4,860 93		
Starkweather & Broadhurst, Inc., Contract 13, for furnishing engine and pump for the Ward Street Pumping Station	26,396 00		
			31,256 93
Total for South Metropolitan System			\$31,849 93
MAINTENANCE AND OPERATION OF WORKS			
North Metropolitan System			
Administration:			
Commissioners	\$1,666 68		
Secretary and assistants	2,090 00		
Rent	287 83		
Heating, lighting and care of building	301 62		
Repairs of building	15 70		
Postage	50 15		
Printing, stationery and office supplies	410 07		
Telephones	48 77		
Miscellaneous expenses	18 20		
			\$4,889 02
General supervision:			
Chief engineer and assistants	\$9,203 33		
Rent	863 54		
Heating, lighting and care of building	904 94		
Repairs of building	47 15		
Postage	106 00		
Printing, stationery and office supplies	344 99		
Telephones	146 32		
Traveling expenses	160 00		
Miscellaneous expenses	117 50		
			11,893 77
Deer Island Pumping Station:			
Labor	\$33,244 56		
Fuel	20,687 16		
Oil and waste	715 77		
Water	1,281 72		
Packing	103 30		
Repairs and renewals	1,500 62		
General supplies	369 88		
Miscellaneous supplies and expenses	262 72		
			58,165 73
East Boston Pumping Station:			
Labor	\$38,319 94		
Fuel	23,553 60		
Oil and waste	941 06		
Water	1,333 20		
Packing	216 17		
Amount carried forward		\$64,363 97	\$74,948 52

GENERAL CHARACTER OF EXPENDITURES

For the Year ending
December 31, 1924

<i>Amount brought forward</i>	\$64,363 97	\$74,948 52
<i>North Metropolitan System — Con.</i>		
<i>East Boston Pumping Station — Con.</i>		
Repairs and renewals	2,712 84	
General supplies	1,179 65	
Miscellaneous supplies and expenses	129 87	
		68,386 33
<i>Charlestown Pumping Station:</i>		
Labor	\$24,543 32	
Fuel	11,734 24	
Oil and waste	708 61	
Water	1,038 84	
Packing	105 91	
Repairs and renewals	7,883 97	
General supplies	430 64	
Miscellaneous supplies and expenses	117 26	
		46,562 79
<i>Alewife Brook Pumping Station:</i>		
Labor	\$12,815 82	
Fuel	4,188 83	
Oil and waste	373 79	
Water	411 96	
Packing	67 36	
Repairs and renewals	163 13	
General supplies	75 73	
Miscellaneous supplies and expenses	27 92	
		18,124 54
<i>Reading Pumping Station:</i>		
Labor	\$6,738 20	
Fuel	299 26	
Packing	25 91	
General supplies	4,327 92	
Miscellaneous supplies and expenses	2 20	
		11,393 49
<i>Sewer lines, buildings and grounds:</i>		
Engineering assistants	\$3,065 00	
Labor	69,752 43	
Automobiles	741 02	
Brick, cement and lime	1,285 05	
Castings, ironwork and metals	1,711 24	
Freight, express and teaming	137 64	
Fuel and lighting	255 84	
Jobbing and repairing	6,886 97	
Lumber	2,453 56	
Machinery, tools and appliances	1,794 97	
Paints and oils	1,534 87	
Rubber and oiled goods	403 03	
Sand, gravel and stone	354 66	
Telephones	390 55	
Traveling expenses	3,254 25	
General supplies	3,009 18	
Miscellaneous expenses	2,790 43	
		99,820 69
Horses, vehicles and stable account		4,241 91
Payments under industrial accident law and special benefit appropriations		1,682 68
<i>Mill Brook Valley Sewer Investigation (Item 670½, Chapter 494, Acts of 1923, reappropriated by Resolve 17, Acts of 1924): —</i>		
Engineering	\$9,177 67	
Additional	515 30	
Real estate: —		
Legal, conveyancing and expert	12 02	
		9,704 99
Total for North Metropolitan System		\$334,865 94
<i>South Metropolitan System</i>		
<i>Administration:</i>		
Commissioners	833 32	
Secretary and assistants	2,285 00	
Rent	230 47	
Heating, lighting and care of building	255 83	
Repairs of building	12 26	
Postage	52 15	
Printing, stationery and office supplies	365 16	
Telephones	48 76	
Miscellaneous expenses	37 82	
		4,120 77
<i>Amount carried forward</i>		\$4,120 77

GENERAL CHARACTER OF EXPENDITURES	For the Year ending December 31, 1924
<i>Amount brought forward</i>	\$4,120 77
<i>South Metropolitan System — Con.</i>	
General supervision:	
Chief engineer and assistants	\$4,819 99
Rent	691 37
Heat, lighting and care of building	767 66
Repairs of building	36 81
Postage	8 00
Printing, stationery and office supplies	129 61
Telephones	146 29
Miscellaneous expenses	7 50
	6,607 23
Ward Street Pumping Station:	
Labor	\$42,727 42
Fuel	24,942 56
Oil and waste	507 02
Water	1,355 64
Packing	938 87
Repairs and renewals	4,272 44
General supplies	15,663 92
Miscellaneous supplies and expenses	1,831 65
	92,239 52
Quincy Pumping Station:	
Labor	\$14,077 40
Fuel	7,340 40
Oil and waste	426 19
Water	614 20
Packing	70 03
Repairs and renewals	11 51
General supplies	381 66
Miscellaneous supplies and expenses	184 63
	23,106 02
Nut Island Screen-house:	
Labor	\$13,277 85
Fuel	4,557 19
Oil and waste	217 04
Water	214 83
Packing	21 12
Repairs and renewals	50 73
General supplies	311 16
Miscellaneous supplies and expenses	134 57
	18,784 49
Sewer Lines, buildings and grounds:	
Engineering assistants	\$6,220 00
Labor	40,598 35
Automobiles	305 44
Brick, cement and lime	222 83
Castings, ironwork and metals	1,209 46
Freight, express and teaming	23 93
Fuel and lighting	46 03
Jobbing and repairing	4,206 03
Lumber	361 49
Machinery, tools and appliances	273 19
Paints and oils	345 63
Rubber and oiled goods	122 73
Sand, gravel and stone	212 91
Telephones	198 68
Traveling expenses	429 00
General supplies	1,292 01
Miscellaneous expenses	108 91
	56,176 62
City of Boston for pumping	10,300 00
Horses, vehicles and stable account	2,582 61
Payments under industrial accident law and special benefit appropriations	706 33
Total for South Metropolitan System	\$214,623 59

(b) *Receipts*

The receipts from the sales of property, from rents and from other sources, have been credited as follows:—

ACCOUNT	For the Year ending December 31, 1924
Construction:	
North Metropolitan System	52 66
Maintenance:	
North Metropolitan System	1,348 70
South Metropolitan System	864 20
Sinking fund:	
North Metropolitan System	75 00
Interest fund:	
North Metropolitan System	25 60
South Metropolitan System	26 67
	\$2,392 83
Amount credited from beginning of work to January 1, 1924	164,549 72
Total receipts to January 1, 1925	\$166,942 55

(c) Assets

The following is an abstract of the assets of the sewerage works, a complete schedule of which is kept on file in the office of the Commission: —

Office furniture, fixtures and supplies; engineering and scientific instruments and supplies; horses, vehicles, field machinery, etc.; machinery, tools and other appliances and supplies; completed works, real estate connected therewith.

(d) Liabilities

There are sundry bills for current expenses which have not yet been received.

Amounts on Monthly Estimates, not due until Completion of Contracts or until Claims are settled

NAME	Work	Amount
High-level sewer extensions:		
Timothy O'Connell	Contract 57, Section 82 (in part)	\$60 00
North System — Enlargement:		
Anthony Baruffaldi	Contract 18, Section 77, Mill Brook Valley Sewer	7,265 37
Antony Cefalo	Contract 16, Section 72 of New Mystic Sewer .	3,089 17

Settlements are pending with the following parties for easements taken in lands owned by them: —

Clifford M. Locke, Martha W. Burrage, Edward and Catherine Bingham, Hannah Bingham, Katherine H. Rooney, Mary A. Read, Hannah E. Pond, Richard G. Wadsworth, Bear Hill Associates, Stoneham Branch Railroad, Arthur L., Frank W. and Harry T. Winn, Arthur A. Bellville, Est. of Joseph E. Bellville, Mary R. Cross, Town of Winchester, Joseph W. Perry, Est. of Samuel Strike, City of Woburn, Imperial Realty Trust, Tr., Annie S. Kiley, Henry Higgins, Edmund M. Warren, Tr., Michael McNulty, Bertha M. Hall, James H. Pillman, Eastern Mass. Street Railway Co., Atlantic Gelatine Co., Town of Arlington, L. Nellie Russell and Irving F. Carpenter, Trustees.

APPENDIX No. 1

CONTRACTS MADE AND PENDING DURING THE
[The details of Contracts made before

1	2	3	AMOUNT OF BID		6	
			4	5		
Number of Contract	WORK	Number of Bids	Next to Lowest	Lowest	Contractor	
1	31 ¹	Laying 60-inch cast-iron water pipes in Weston.	10	\$50,125 00	\$40,866 90 ²	Bryne & Company, Boston.
2	32 ¹	Constructing Northern Extra-High Service Reservoir on Arlington Heights(Masonry Tower).	3	157,894 00	154,858 00 ²	Crane Construction Company, Inc., Boston.
3	35	Building and erecting pumping engine for Spot Pond Pumping Station.	3	69,000 00 ²	67,470 00	Worthington Pump & Machinery Corporation, New York.
4	36 ¹	Furnishing and erecting gallery and railing for economizer at Chestnut Hill Pumping Sta. No. 1 and galleries and railing for boiler at Spot Pond Pumping Station.	3	1,290 00	1,265 00 ²	Smith & Lovett Company, Boston.
5	37 ¹	Furnishing and laying 60-inch steel water pipes in Weston and Waltham, Section 9 of Weston Aqueduct Supply Mains.	13	341,790 00	320,413 00 ²	T. A. Gillespie Company, New York.
6	38 ¹	Furnishing and applying non-heat-conducting covering at Chestnut Hill Pumping Station in Boston and Spot Pond Pumping Station in Stoneham.	5	2,488 00	2,207 00 ²	Keasbey & Mattison Company, Boston.
7	39 ¹	Furnishing water valves; 24 16-inch screw lift; 3 36-inch screw lift and 3 36-inch hydraulic lift valves.	3	35,144 00	28,098 00 ²	Atlantic Works, East Boston.
8	40	Furnishing automatic air valves.	2	3,125 00	2,232 50 ²	Atlantic Works, East Boston.
9	41 ¹	Furnishing cast iron water pipes.	1	-	868 50 ²	United States Cast Iron Pipe & Foundry Co., Philadelphia, Pa.
10	42 ¹	Building engine foundation and making alteration at Spot Pond Pumping Station	4	10,975 00	9,930 00 ²	James Driscoll & Son Company, Brookline, Mass.
11	43 ¹	Furnishing cast-iron frames and covers for gate chambers: about 40,000 pounds.	2	1,980 00	1,900 00 ²	Fred A. Houdlette & Son, Inc., Boston.
12	44	Furnishing and laying 60-inch steel water pipes in Waltham, Section 10 of Weston Aqueduct Supply Mains.	4	695,620 00	563,230 00 ²	C. and R. Construction Co., Boston.

¹ Contract completed.

APPENDIX No. 1

YEAR 1924 — WATER DIVISION

1924 have been given in previous reports.]

7	8	9	10	
Date of Contract	Date of Completion of Contract	Prices of Principal Items of Contracts	Value of Work done Dec. 31, 1924	
June 28, 1923	June 20, 1924	See previous annual report.	\$44,486 51	1
July 17, 1923	June 12, 1924	See previous annual report.	158,873 03	2
Oct. 18, 1923	-	See previous annual report.	48,300 00	3
Dec. 26, 1923	Feb. 20, 1924	See previous annual report.	1,265 00	4
Feb. 1, 1924	Oct. 14, 1924	For furnishing and laying 60-inch steel pipes, \$27.25 per lin. ft.; laying 60-inch, 48-inch and 36-inch cast-iron pipes, \$15.00 per lin. ft.; laying 24-inch and smaller cast-iron pipes for blow-offs, \$10.00 per lin. ft.; for rock excavation above grade, \$3.00 per cu. yd.; for rock excavation below grade, \$1.00 per cu. yd.; for earth excavation below grade, \$3.00 per cu. yd.; for chambers for blow-off, by-pass and connection valves, \$181 per chamber; for chambers for 36-inch valves, \$251 per chamber; for chambers for air valves, \$181 per chamber; for concrete masonry, \$11.00 per cu. yd.	327,780 91	5
Feb. 4, 1924	Apr. 16, 1924	For furnishing and applying non-heat-conducting covering at Chestnut Hill Pumping Station No. 1, \$698; for furnishing and applying non-heat-conducting covering at Spot Pond Pumping Station, \$1,509.	2,207 00	6
Mar. 4, 1924	Oct. 16, 1924	For 16-inch screw lift valves, \$641 per valve; for 36-inch screw lift valves, \$1,919 per valve; for 36-inch hydraulic lift valves, \$2,319 per valve.	28,098 00	7
Mar. 31, 1924	-	For automatic air valves, \$79.70 per valve; for attaching air valves to manhole covers, \$9.60 per set.	2,700 00	8
Apr. 28, 1924	June 4, 1924	For 6-inch straight pipe, Class G, \$57.90 per ton of 2,000 pounds.	862 57	9
Apr. 16, 1924	July 1, 1924	For masonry excavation, \$20.00 per cu. yd.; for earth excavation, \$7.00 per cu. yd.; for concrete masonry, Class A, \$15.00 per cu. yd., Class B, \$18.00 per cu. yd.; for structural steelwork, \$0.10 per lb.; for replacing slate and granolithic surfaces, \$1.00 per sq. ft.	9,957 90	10
Apr. 23, 1924	Aug. 1, 1924	For cast iron frames and covers for gate chambers, delivered, \$0.04½ per pound.	1,861 05	11
July 10, 1924	-	For furnishing and laying 60-inch steel pipe ¾ inch in thickness, of the lock-bar type, \$35.00 per lin. ft.; for furnishing and laying 60-inch steel pipe ½ inch in thickness of the lock-bar type, \$40.00 per lin. ft.; for laying 60-inch and 36-inch cast-iron pipe furnished by the Commonwealth, \$10.00 per lin. ft.; for laying 16-inch and smaller cast-iron pipe furnished by the Commonwealth, for blow-offs and connections, \$6.00 per lin. ft.; for rock excavation, above regular grade, \$8.00 per cu. yd., below regular grade, \$15.00 per cu. yd.; for earth excavation below regular grade, \$5.00 per cu. yd.; for chambers, for blow-off, by-pass and connection valves, \$140 per chamber, for 36-inch valves, \$200 per chamber, for air valves, \$100 per chamber; for concrete masonry for foundations, anchorages and support for pipes, \$14.00 per cu. yd.; for spruce lumber in place for foundations in wet ground, \$60.00 per M. ft. B. M.	336,478 48	12

2 Contract based upon this bid.

CONTRACTS MADE AND PENDING DURING THE

	1	2	3	AMOUNT OF BID —		6
	Num- ber of Con- tract	WORK	Num- ber of Bids	4 Next to Lowest	5 Lowest	Contractor
13	45 ¹	Furnishing 40 tons 36-inch and 133 tons 60-inch cast-iron water pipe, and 158 tons special castings.	1	—	\$28,692 70	Warren Foundry & Pipe Co., Phillipsburg, N. J.
14	46	Furnishing flanged special castings, approximately 19 tons.	2	\$5,525 00	5,500 00 ²	The Lumsden & Van Stone Co., Boston.
15	47	Furnishing and laying 56-inch steel water pipes in Waltham, Belmont and Arlington, Section 11 of Weston Aqueduct Supply Mains	7	580,715 00 (or for 60-inch riveted steel pipe \$543,755 00)	512,629 00 ²	T. A. Gillespie Company, New York.
16	18-M ¹	Furnishing 30 tons cast-iron water pipe and 135 tons special castings.	2	25,207 50	20,830 00 ²	U. S. Cast Iron Pipe & Foundry Co., Philadelphia, Pa.
17	20-M ¹	Repairing roofs of Water Works buildings in Boston, Brookline and Newton.	2	5,942 00	5,781 00 ²	Charles V. Browne, Winthrop, Mass.
18	21-M	Sale and cutting of chestnut and miscellaneous standing timber on marginal lands of the Wachusett Reservoir.	2	5,000 00 ⁴	9,750 00 ^{2 3}	Wilder, Walker & Davis Co., Sterling, Mass.
19	22-M	Repairing roofs of Water Works buildings in Stoneham and Weston.	2	3,975 00	3,760 00 ²	Charles V. Browne, Winthrop, Mass.

¹ Contract completed.² Contract based upon this bid.

YEAR 1924 — WATER DIVISION — Continued

7	8	9	10	
Date of Contract	Date of Completion of Contract	Prices of Principal Items of Contracts	Value of Work done Dec. 31, 1924	
Apr. 30, 1924	Sept. 25, 1924	For 36-inch straight pipe Class D, \$48.10 per ton of 2,000 lbs.; for 60-inch straight pipe, Class D, \$59.90 per ton of 2,000 lbs.; for bell and spigot special castings, \$119 per ton of 2,000 lbs.	30,043 17	13
May 3, 1924	Oct. 8, 1924	For furnishing ten special flanged castings, weighing approximately 19 tons, \$5,500.	5,874 00	14
Oct. 3, 1924	-	For furnishing and laying 56-inch lock-bar steel pipe, \$26.84 per lin. ft.; for laying 16-inch and smaller cast-iron pipe, furnished by the Commonwealth, for blow-offs and connections, \$8.00 per lin. ft.; for laying 6-inch cast-iron pipes, furnished by the Commonwealth, for air inlets, \$2.00 per lin. ft.; for rock excavation, above established grade, \$5.00 per cu. yd., below established grade, \$2.00 per cu. yd.; for earth excavation below established grade, \$1.00 per cu. yd.; for chambers, for 36-inch valves, \$200 per chamber, for blow-off, by-pass and connection valves, \$120 per chamber, for air valves, \$75.00 per chamber; for concrete masonry for foundations, anchorages, and support for pipes, \$12.00 per cu. yd.; for bituminous macadam resurfacing in streets, \$1.10 per sq. yd.	118,721 68	15
Apr. 30, 1923	Oct. 8, 1924	See previous annual report	21,245 57	16
Sept. 25, 1923	Feb. 11, 1924	See previous annual report	5,781 00	17
Dec. 7, 1923	-	See previous annual report	8,450 00	18
Oct. 7, 1924	-	For repairing roof of Spot Pond Pumping Station, \$1,670; for repairing roofs of gate houses at Spot Pond, \$650; for repairing gate chambers in Weston, \$1,100; for removing tiles, applying paper and replacing tiles on certain sections of roofs, \$4.00 per sq. yd.	2,200 00	19

³ Highest bid.⁴ Next to highest bid.

CONTRACTS MADE AND PENDING DURING THE YEAR 1924 — WATER DIVISION —
Concluded

Summary of Contracts, 1895 to 1924, inclusive¹

	Value of Work done Dec. 31, 1924
Distribution Section, 11 contracts	\$1,055,779 40
Pumping Service, 4 contracts	61,729 90
	\$1,117,509 30
432 contracts completed from 1896 to 1923, inclusive	18,207,496 92
	\$19,325,006 22
Deduct for work done on 11 Sudbury Reservoir contracts by the city of Boston .	512,000 00
Total of 447 contracts	\$18,813,006 22

In this summary contracts for the sale of used material and contracts charged to maintenance are excluded.

APPENDIX NO. 2

TABLE No. 1. — Monthly Rainfall in Inches at Various Places on the Metropolitan Water Works, 1924

PLACE	January	February	March	April	May	June	July	August	September	October	November	December	Totals
Wachusett Watershed:													
Princeton	4.12	3.34	2.12	6.21	3.45	1.04	2.54	5.10	4.76	0.14	3.37	2.11	38.30
Jefferson	4.40	3.41	2.83	6.93	3.72	1.40	3.09	4.72	5.18	0.06	3.71	2.12	41.57
Sterling	3.92	3.49	2.15	6.95	3.55	1.10	2.55	4.37	4.01	0.09	2.98	2.06	37.22
Boylston	4.46	2.99	2.54	6.22	3.50	0.99	2.23	4.24	5.20	0.08	3.14	1.84	37.43
Sudbury Watershed:													
Sudbury Dam	3.52	2.31	2.53	5.73	3.19	1.24	3.05	4.45	5.38	0.10	2.45	1.61	35.56
Framingham	3.64	2.60	2.87	5.18	3.11	1.62	3.13	4.48	5.91	0.10	2.57	1.72	36.93
Ashland Dam	3.42	2.51	2.67	5.12	3.08	1.47	2.54	5.09	5.33	0.12	2.26	1.72	35.33
Cordaville	3.81	2.81	2.58	5.91	3.49	1.64	4.04	4.91	6.07	0.14	2.75	1.85	40.00
Lake Cochituate	3.52	2.68	2.80	5.30	3.20	1.71	2.78	5.16	6.00	0.09	2.40	1.76	37.40
Chestnut Hill Reservoir	3.60	2.99	2.36	5.26	3.01	1.27	1.88	6.20	8.77	0.12	1.72	1.63	38.81
Spot Pond	3.98	2.36	2.47	4.55	3.52	2.81	1.99	6.71	9.87	0.06	2.36	1.72	42.40
Average of all	3.86	2.86	2.54	5.76	3.35	1.48	2.71	5.04	6.04	0.10	2.70	1.83	38.27
Average, Wachusett Watershed	4.23	3.31	2.41	6.58	3.55	1.13	2.60	4.61	4.79	0.09	3.30	2.03	38.63
Average, Sudbury Watershed	3.60	2.56	2.66	5.49	3.22	1.49	3.19	4.73	5.67	0.11	2.51	1.73	36.96

TABLE NO. 2. — *Rainfall in Inches at Chestnut Hill Reservoir, 1924*

DATE	Amount ¹	Duration	DATE	Amount	Duration
Jan. 2 .	.75 ²	11.15 P.M. to	July 9 .	.12	9.35 P.M. to 10.40 P.M.
Jan. 3 .		4.00 P.M.	July 10 .	.11	4.30 P.M. to 5.10 P.M.
Jan. 5 .	.27 ¹	8.00 A.M. to 3.15 A.M.	July 12 .	.16	5.55 A.M. to
Jan. 10 .	.06	10.10 P.M. to 4.15 A.M.	July 13 .		6.30 P.M.
Jan. 11 .	.48	8.00 A.M. to 4.00 P.M.	July 17 .	.40	1.30 P.M. to 3.00 P.M.
Jan. 16 .	.85	5.40 P.M. to 1.30 A.M.	July 24 .	.22	6.00 P.M. to 6.50 P.M.
Jan. 24 .	1.19 ²	11.35 P.M. to 5.45 A.M.	July 25 .	.05	3.40 P.M. to 4.00 P.M.
Total	3.60		July 27 .	.05	8.30 A.M. to 9.45 A.M.
			July 31 .	.77	4.00 P.M. to 9.00 P.M.
				1.88	
Feb. 2 .	.10 ¹	12.15 A.M. to	August 4 .	.02	5.50 A.M. to 6.30 A.M.
Feb. 3 .		10.00 A.M.	August 6 .	.14	8.10 P.M. to 9.05 P.M.
Feb. 4 .	1.15 ²	8.00 A.M. to	August 7 .	.16	5.50 P.M. to 9.00 P.M.
Feb. 7 .		9.45 A.M.	August 10 .	.23	8.10 P.M. to 10.45 P.M.
Feb. 10 .	.13 ¹	11.15 A.M. to 6.00 P.M.	August 11 .	1.41	5.10 A.M. to
Feb. 17 .	.08 ¹	11.00 P.M. to 3.30 A.M.	August 12 .		7.30 P.M.
Feb. 19 .	1.53 ²	2.00 A.M. to	August 17 .	.39	1.40 P.M. to 4.30 A.M.
Feb. 20 .		6.30 P.M.	August 20 .	.05	7.15 P.M. to 7.30 P.M.
	2.99		August 23 .	.02	10.45 A.M. to 12.15 P.M.
			August 25 .	3.78	5.40 P.M. to
March 5 .	.03	9.30 A.M. to 11.30 A.M.	August 26 .		5.00 P.M.
March 6 .	.04	3.30 A.M. to		6.20	
March 7 .	1.76 ²	8.30 P.M.	Sept. 1 .	.48	10.15 A.M. to 11.45 A.M.
March 10 .		11.20 P.M. to	Sept. 2 .	.51	7.05 P.M. to 5.30 A.M.
March 12 .	.42	8.30 P.M.	Sept. 5 .	.47	9.00 P.M. to 12.15 A.M.
March 29 .		3.05 P.M. to 3.30 A.M.	Sept. 8 .	.05	1.45 A.M. to 6.10 A.M.
March 30 .	.11	5.15 P.M. to 7.30 P.M.	Sept. 9 .	5.72	8.50 P.M. to
	2.36		Sept. 10 .		3.30 P.M.
			Sept. 17 .	.30	9.30 A.M. to 5.45 A.M.
April 1 .	1.55 ²	7.30 P.M. to	Sept. 22 .	.59	11.45 P.M. to
April 2 .		9.10 A.M.	Sept. 23 .		10.30 A.M.
April 6 .	1.59	8.00 P.M. to	Sept. 30 .	.65	3.30 P.M. to 11.15 P.M.
April 8 .		3.15 A.M.		8.77	
April 9 .	.07	8.15 P.M. to 3.30 A.M.			
April 13 .	.04	4.00 A.M. to 6.30 A.M.			
April 18 .	1.08	2.15 P.M. to 7.30 A.M.			
April 20 .	.25	9.30 A.M. to 11.15 P.M.			
April 21 .	.26	3.00 A.M. to			
April 22 .		5.30 P.M.			
April 25 .	.03	12.15 P.M. to 1.30 A.M.			
April 30 .	.39	7.45 P.M. to 7.00 A.M.			
	5.26				
May 1 .	.12	7.00 A.M. to 10.00 A.M.	Oct. 7 .	.12	6.00 P.M. to 6.45 A.M.
May 4 .	.06	7.15 A.M. to 7.45 A.M.			
May 5 .	.04	5.45 A.M. to	Nov. 11 .	.02	7.40 P.M. to 10.00 P.M.
May 6 .		9.45 A.M.	Nov. 13 .	.03	2.15 A.M. to 6.00 A.M.
May 8 .	2.06	4.25 P.M. to	Nov. 21 .	.03	5.15 A.M. to 5.50 A.M.
May 13 .		9.00 A.M.	Nov. 22 .	.96	7.30 P.M. to
May 14 .	.08	4.20 A.M. to 5.45 A.M.	Nov. 23 .		5.30 P.M.
May 19 .	.03	3.00 A.M. to	Nov. 24 .	.13	8.30 A.M. to 12.00 P.M.
May 22 .	.56	9.00 A.M.	Nov. 29 .	.55 ²	9.45 A.M. to 1.45 A.M.
May 24 .		6.40 P.M. to		1.72	
May 25 .		8.30 A.M.			
May 27 .	.03	8.10 P.M. to 3.30 A.M.			
May 28 .	.03	5.30 P.M. to 7.30 P.M.			
	3.01				
June 3 .	.27	3.15 A.M. to	Dec. 5 .	.40	7.45 P.M. to 4.45 A.M.
June 4 .		2.30 A.M.	Dec. 8 .	.29	1.45 P.M. to 2.00 A.M.
June 6 .	.03	4.30 P.M. to 6.30 A.M.	Dec. 12 .	.17 ²	12.30 A.M. to
June 8 .	.03	4.30 P.M. to 11.00 P.M.	Dec. 13 .		10.00 P.M.
June 14 .	.20	7.00 A.M. to 3.30 A.M.	Dec. 17 .	.13	7.30 A.M. to 12.15 P.M.
June 21 .	.35	7.00 A.M. to 10.00 A.M.	Dec. 18 .	.21	8.15 P.M. to
June 25 .	.37	8.30 A.M. to 9.00 P.M.	Dec. 19 .		5.30 P.M.
June 27 .	.02	2.30 P.M. to 2.50 P.M.	Dec. 23 .	.43 ¹	6.30 A.M. to
	1.27		Dec. 24 .		4.35 P.M.
				1.63	

Total for year 38.81 inches.

¹ Snow.² Rain and Snow.

TABLE No. 3. — *Wachusett System. — Statistics of Flow of Water, Storage and Rainfall in 1924*
[Watershed above dam = 108.84 square miles]

MONTH	GALLONS PER DAY										Rainfall (Inches)	Rainfall Collected (Inches)	Percent- age of Rainfall Col- lected
	Taken by Town of Clinton	Taken by City of Worcester	Received from City of Worcester Watershed	Discharged into Wachusett Aqueduct ¹	Wasted into River below Dam	Seepage through the North Dike ²	STORAGE ³		Total Yield of Water- shed	Yield per Square Mile			
							Gain	Loss					
January . . .	—	—	2,777,000	68,616,000	1,774,000	887,000	135,658,000	—	204,158,000	1,876,000	4.23	3.346	79.2
February . . .	—	—	2,066,000	109,821,000	1,693,000	924,000	—	23,472,000	86,900,000	798,000	3.31	1.332	40.3
March . . .	—	—	923,000	72,845,000	1,691,000	913,000	110,203,000	—	184,729,000	1,697,000	2.41	3.028	125.6
April . . .	—	—	21,593,000	97,295,000	200,545,000	991,000	181,265,000	—	458,503,000	4,213,000	6.58	7.262	110.4
May . . .	—	—	4,968,000	91,535,000	128,636,000	1,000,000	—	1,497,000	214,706,000	1,973,000	3.55	3.519	99.0
June . . .	40,000	—	—	115,860,000	5,963,000	1,000,000	—	74,010,000	48,853,000	449,000	1.13	0.775	68.4
July . . .	261,000	—	—	137,603,000	1,774,000	981,000	—	126,342,000	14,277,000	131,000	2.60	0.234	9.0
August . . .	494,000	—	—	122,661,000	1,832,000	929,000	—	98,510,000	27,406,000	252,000	4.61	0.449	9.7
September . . .	426,000	—	—	108,855,000	1,744,000	896,000	—	77,146,000	34,775,000	320,000	4.79	0.552	11.5
October . . .	565,000	—	—	129,184,000	1,806,000	861,000	—	125,468,000	6,948,000	64,000	0.09	0.114	122.5
November . . .	610,000	2,957,000	—	95,583,000	1,660,000	810,000	—	71,610,000	30,010,000	276,000	3.30	0.476	14.4
December . . .	616,000	4,887,000	—	132,165,000	1,716,000	787,000	—	97,313,000	42,858,000	394,000	2.03	0.702	34.6
Total Average for year	252,000	656,000	2,665,000	106,847,000	29,110,000	915,000	—	22,508,000	112,607,000	1,035,000	38.63	21.789	56.4

¹ Including 196,000 gallons per day drawn from aqueduct for the supply of the Westborough State Hospital.

² Estimated.

³ Aggregate storage in Wachusett Reservoir and in ponds and mill reservoirs.

TABLE No. 4. — *Sudbury System — Statistics of Flow of Water, Storage and Rainfall in 1924*
[Watershed = 75.2 square miles]

MONTH	GALLONS PER DAY							Rain-fall Col-lected (Inches)	Rain-fall Col-lected (Inches)	Percent-age of Rain-fall Col-lected		
	Water received from Wachusett Reservoir ¹	Water discharged through Sudbury Aqueduct	Water discharged through Weston Aqueduct	Water used by Framing-ham Water Works	Water di-verted from Watershed by Sewers, etc.	Water wasted into River below Lowest Dam	STORAGE					
							Gain				Loss	
January	68,429,000	65,061,000	60,236,000	1,261,000	1,929,000	84,432,000	—	9,406,000	135,084,000	1,796,000	3.60	89.1
February	109,638,000	60,890,000	65,269,000	1,407,000	800,000	34,710,000	338,000	—	53,776,000	715,000	2.56	46.7
March	72,661,000	51,287,000	64,335,000	1,332,000	1,400,000	88,355,000	11,881,000	—	145,929,000	1,941,000	2.66	130.0
April	97,095,000	49,692,000	62,834,000	1,148,000	2,474,000	191,386,000	19,360,000	—	229,799,000	3,056,000	5.49	96.1
May	91,348,000	48,306,000	62,503,000	1,084,000	1,552,000	88,858,000	—	5,745,000	105,200,000	1,399,000	3.22	77.6
June	115,660,000	57,667,000	61,093,000	1,167,000	900,000	19,597,000	—	4,013,000	21,117,000	281,000	1.49	32.5
July	137,387,000	65,855,000	62,019,000	1,368,000	710,000	2,923,000	—	265,000	—3,942,000	—52,000	3.19	—2.9
August	122,442,000	58,864,000	61,113,000	1,264,000	839,000	6,939,000	1,284,000	—	8,716,000	116,000	4.73	4.4
September	108,656,000	55,063,000	63,665,000	1,182,000	922,000	13,055,000	150,000	—	30,707,000	408,000	5.67	12.4
October	129,000,000	60,435,000	62,987,000	1,239,000	668,000	6,539,000	—	3,803,000	484,000	6,000	0.11	10.0
November	95,387,000	59,483,000	60,903,000	1,187,000	607,000	8,760,000	—	23,093,000	12,460,000	166,000	2.51	11.4
December	131,971,000	62,884,000	65,371,000	1,277,000	603,000	16,213,000	6,252,000	—	20,629,000	274,000	1.73	28.4
Total	—	—	—	—	—	—	—	—	—	—	—	—
Av. for year	106,651,000	57,969,000	62,686,000	1,243,000	1,117,000	46,735,000	—	582,000	63,248,000	841,000	36.96	47.9

¹ Not including 196,000 gallons per day drawn from the Wachusett Aqueduct for the supply of the Westborough State Hospital, which were not discharged into Sudbury Reservoir.

TABLE No. 5. — Cochituate System — Statistics of Flow of Water, Storage and Rainfall in 1924
[Watershed of lake = 17.58 square miles¹]

MONTH	GALLONS PER DAY							Rainfall Collected (Inches)	Rainfall Collected (Inches)	Percent- age of Rainfall Collected
	Water discharged through Cochituate Aqueduct	Water di- verted from Watershed by Sewers, etc.	Water wasted at Outlet of Lake	STORAGE		Total Yield of Watershed	Yield per Square Mile			
				Gain	Loss					
January	—	1,468,000	28,212,000	—	1,945,000	27,735,000	1,578,000	3.52	2.81	80.0
February	—	738,000	14,452,000	—	2,069,000	13,141,000	748,000	2.68	1.25	46.5
March	—	1,432,000	30,300,000	—	—	34,639,000	1,970,000	2.80	3.51	125.5
April	—	2,560,000	32,449,000	2,907,000	—	42,346,000	2,409,000	5.30	4.15	78.0
May	—	1,506,000	21,168,000	7,337,000	—	23,816,000	1,355,000	3.20	2.42	75.5
June	—	720,000	3,073,000	1,142,000	—	6,793,000	386,000	1.71	0.67	39.0
July	—	274,000	—	3,000,000	229,000	45,000	3,000	2.78	0.01	0.2
August	—	300,000	3,222,000	384,000	—	3,906,000	222,000	5.16	0.39	7.7
September	—	732,000	6,681,000	1,425,000	—	8,858,000	504,000	6.00	0.87	14.5
October	—	387,000	2,339,000	—	1,610,000	1,116,000	63,000	0.09	0.11	125.9
November	—	380,000	2,440,000	710,000	—	3,530,000	201,000	2.40	0.35	14.4
December	—	452,000	10,319,000	—	5,645,000	5,126,000	292,000	1.76	0.52	29.6
Total	—	915,000	—	—	—	—	—	37.40	17.06	45.6
Average for year	—	—	12,895,000	434,000	—	14,244,000	810,000	—	—	—

¹ Not including the watersheds of Dudley and Dug ponds.

TABLE NO. 6. — Sources from which and Periods during which Water has been drawn for the Supply of the Metropolitan Water District

From Wachusett Reservoir into the Wachusett Aqueduct

MONTH	Number of Days during which Water was Flowing	ACTUAL TIME		Million Gallons Drawn
		Hours	Minutes	
January	26	264	0	2,127.1
February	24	241	45	3,184.8
March	20	207	0	2,258.2
April	20	274	45	2,914.8
May	26	288	15	2,837.6
June	25	253	10	3,475.8
July	26	291	18	4,265.7
August	26	364	3	3,802.5
September	25	319	15	3,270.2
October	26	276	45	4,004.7
November	24	236	30	2,867.5
December	26	276	45	4,097.1
Totals	294	137.23 days		39,106.0

From Sudbury Reservoir through the Weston Aqueduct to Weston Reservoir

MONTH	Number of Days during which Water was Flowing	ACTUAL TIME		Million Gallons Drawn
		Hours	Minutes	
January	26	439	14	1,867.3
February	24	413	15	1,892.8
March	26	436	35	1,994.4
April	26	488	00	1,882.4
May	26	442	00	1,937.6
June	25	428	26	1,832.8
July	26	442	20	1,922.6
August	26	423	20	1,894.5
September	26	436	40	1,912.6
October	27	444	20	1,952.6
November	25	412	41	1,827.1
December	26	451	29	2,026.5
Totals	309	219.10 days		22,943.2

From Framingham Reservoir No. 3 through the Sudbury Aqueduct to Chestnut Hill Reservoir

MONTH	Number of Days during which Water was Flowing	Actual Time (Hours)	Million Gallons Drawn
January	31	744	2,016.9
February	29	696	1,765.8
March	31	744	1,589.9
April	30	719	1,488.7
May	31	729	1,497.5
June	30	720	1,730.0
July	31	744	2,041.5
August	31	744	1,824.8
September	30	717	1,654.2
October	31	744	1,873.5
November	30	685	1,784.5
December	31	744	1,949.4
Totals	366	8,730	21,216.7

TABLE NO. 7. — *Average Daily Quantity of Water flowing through Aqueducts in 1924, by Months¹*

MONTH	Wachusett Aqueduct into Sudbury Reservoir (Gallons)	Weston Aqueduct into Metropolitan District (Gallons)	Sudbury Aqueduct into Chestnut Hill Reservoir (Gallons)	Cochituate Aqueduct into Chestnut Hill Reservoir (Gallons)
January	68,429,000	60,236,000	65,061,000	—
February	109,638,000	65,269,000	60,890,000	—
March	72,661,000	64,335,000	51,287,000	—
April	97,095,000	62,834,000	49,692,000	—
May	91,348,000	62,503,000	48,306,000	—
June	115,660,000	61,093,000	57,667,000	—
July	137,387,000	62,019,000	65,855,000	—
August	122,442,000	61,113,000	58,864,000	—
September	108,656,000	63,665,000	55,063,000	—
October	129,000,000	62,987,000	60,435,000	—
November	95,387,000	60,903,000	59,483,000	—
December	131,971,000	65,371,000	62,884,000	—
Average	106,651,000	62,686,000	57,969,000	—

¹ Not including quantities wasted while cleaning and repairing aqueducts.

TABLE No. 8. — (Meter Basis.) Average Daily Consumption of Water by Districts in the Cities and Towns supplied by the Metropolitan Water Works in 1924. (For Consumption of Water in Whole Metropolitan Water District, see Table No. 9)

MONTH	SOUTHERN LOW SERVICE		NORTHERN LOW SERVICE		SOUTHERN HIGH SERVICE		NORTHERN HIGH SERVICE		SOUTHERN EXTRA HIGH SERVICE		NORTHERN EXTRA HIGH SERVICE		Total District Supplied (Gallons)	Estimated Population	Consumption per Inhabitant (Gallons)
	Boston, Excluding East Boston and Charlestown (Gallons)	Portions of Charlestown, Somerville, Chelsea, Everett, Malden, Medford, East Boston and Arlington (Gallons)	Quincy, Watertown, and Portions of Boston, Belmont and Milton (Gallons)	Revere, Winthrop, Swampscott, Nahant, Stoneham, Melrose, and Portions of Boston, Chelsea, Everett, Malden, Somerville (Gallons)	Portions of Boston and Milton (Gallons)	Lexington and Portions of Arlington and Belmont (Gallons)									
January	45,204,900	28,940,200	44,770,200	10,059,700	921,600	964,100	130,860,700	1,292,820	101						
February	44,106,600	28,900,800	43,364,600	10,047,100	858,200	950,400	128,227,700	1,294,020	99						
March	42,571,000	26,902,400	41,472,000	9,870,600	916,900	959,100	122,692,000	1,295,210	95						
April	39,883,700	26,282,500	40,401,900	9,835,100	1,172,400	980,200	118,555,800	1,296,410	91						
May	38,858,500	25,527,700	39,802,700	10,229,000	1,046,900	1,163,700	116,628,500	1,297,610	90						
June	39,055,700	26,685,100	41,147,100	11,374,000	1,017,500	1,172,800	120,452,200	1,298,800	93						
July	40,613,200	28,687,200	42,806,800	12,674,600	1,184,400	1,575,100	127,541,300	1,300,000	98						
August	39,902,100	28,544,900	42,328,300	12,176,300	1,042,400	1,276,700	125,270,700	1,301,500	96						
September	40,461,500	28,875,700	43,312,900	11,586,600	951,600	1,172,200	126,360,500	1,303,000	97						
October	40,024,700	27,893,300	42,596,600	10,917,000	1,003,100	1,195,300	123,630,000	1,304,500	95						
November	40,400,800	27,182,400	41,077,500	10,527,700	1,014,500	1,148,400	121,351,300	1,306,000	93						
December	43,105,400	29,285,100	42,988,300	10,104,500	958,500	1,138,100	127,579,900	1,307,500	98						
For the year	41,179,800	27,809,100	42,173,500	10,787,000	1,007,700	1,142,600	124,099,700	1,300,000	95						

In addition to the above quantities the United States Government Reservation on Peddock's Island was supplied with 18,087,000 gallons equivalent to an average daily rate of 49,400 gallons and a part of Saugus with 27,646,000 gallons, equivalent to an average daily rate of 75,500 gallons and Newton with 98,762,000 gallons, equivalent to an average daily rate of 269,800 gallons. As the town of Saugus purchased from the city of Revere the pipe system located in Saugus, Revere discontinued the supply to a portion of Saugus on Nov. 17, 1924.

TABLE No. 9. — (Meter Basis.) Average Daily Consumption of Water in Cities and Towns supplied by the Metropolitan Water Works in 1924

City or town	ARLINGTON		BELMONT		BOSTON		CHELSEA		EVERETT		LEXINGTON		MALDEN	
	Population		13,850		787,620		46,600		44,100		6,990		53,350	
	GALLONS		GALLONS		GALLONS		GALLONS		GALLONS		GALLONS		GALLONS	
MONTH	Per Day		Per Day		Per Day		Per Day		Per Day		Per Day		Per Day	
	Per Capita		Per Capita		Per Capita		Per Capita		Per Capita		Per Capita		Per Capita	
January	1,209,300	53	755,100	56	95,625,200	122	3,794,600	82	4,549,000	104	344,800	50	2,571,300	49
February	1,218,800	53	770,600	57	93,144,700	118	3,736,000	81	4,516,100	103	339,000	49	2,605,700	49
March	1,217,700	52	794,700	58	88,685,200	113	3,564,700	77	4,286,800	98	353,000	51	2,602,800	49
April	1,205,900	52	802,500	59	84,572,600	107	3,458,800	75	4,130,700	94	380,500	55	2,703,000	51
May	1,381,100	59	830,700	61	82,543,600	105	3,319,800	71	3,959,900	90	401,900	58	2,618,700	49
June	1,467,600	62	966,700	70	83,329,600	106	3,381,200	73	4,225,400	96	492,200	71	2,648,000	50
July	1,869,800	79	1,238,800	89	86,516,800	110	3,571,800	77	4,528,200	103	653,800	94	3,292,200	62
August	1,487,100	63	966,900	70	86,184,600	109	3,571,800	77	4,731,600	107	527,600	75	3,061,400	57
September	1,395,700	59	875,300	63	88,284,500	112	3,567,300	76	4,719,900	107	457,200	65	3,163,200	59
October	1,466,600	62	892,200	64	86,326,800	110	3,447,700	74	4,675,000	106	485,200	69	3,053,700	57
November	1,392,300	58	877,900	63	85,741,800	108	3,497,500	75	4,453,100	101	481,900	68	2,886,900	54
December	1,412,400	59	867,100	62	90,890,500	115	3,711,300	79	5,109,400	115	452,800	64	3,094,100	58
For the year.	1,395,000	59	887,200	64	87,680,900	111	3,551,700	76	4,491,500	102	448,000	64	2,859,900	54

TABLE No. 9. — *Average Daily Consumption of Water in Cities and Towns, etc. — Continued*

City or town . . .	MEDFORD	MELROSE	MILTON	NAHANT	QUINCY	REVERE
Population . . .	46,150	19,390	11,450	1,550	53,260	31,000
	GALLONS	GALLONS	GALLONS	GALLONS	GALLONS	GALLONS
MONTH	Per Day	Per Day	Per Day	Per Day	Per Day	Per Day
	Per Capita	Per Capita	Per Capita	Per Capita	Per Capita	Per Capita
January . . .	2,428,700	1,237,400	467,100	90,700	4,125,000	2,079,000
February . . .	2,432,700	1,212,200	491,800	83,800	4,047,300	2,075,000
March . . .	2,464,800	1,175,600	495,400	94,900	3,998,400	1,996,200
April . . .	2,311,800	1,124,000	505,800	119,200	4,019,200	2,058,300
May . . .	2,364,700	1,172,300	500,500	157,800	4,176,600	2,190,400
June . . .	2,543,200	1,344,700	536,000	299,100	4,629,500	2,310,800
July . . .	2,618,800	1,445,000	580,100	405,300	4,980,000	2,744,700
August . . .	2,418,600	1,297,900	520,800	434,400	4,941,200	2,753,200
September . . .	2,471,300	1,284,400	530,900	283,600	4,734,800	2,513,100
October . . .	2,460,800	1,285,100	580,200	167,500	4,545,200	2,343,600
November . . .	2,370,200	1,274,400	600,600	118,900	3,970,700	2,197,000
December . . .	2,408,600	1,114,400	633,200	89,000	4,039,000	2,241,400
For the year . . .	2,441,400	1,247,400	537,000	195,800	4,352,400	2,293,300
	53	64	47	126	82	74

TABLE No. 9. — Average Daily Consumption of Water in Cities and Towns, etc. — Concluded

City or town . . .	SOMERVILLE		STONEHAM		SWAMPSCOTT		WATERTOWN		WINTHROP		METROPOLITAN DISTRICT	
	100,660		8,230		8,400		26,100		17,700		1,300,000	
	GALLONS		GALLONS		GALLONS		GALLONS		GALLONS		GALLONS	
MONTH	Per Day		Per Day		Per Day		Per Day		Per Day		Per Day	
	Per Capita		Per Capita		Per Capita		Per Capita		Per Capita		Per Capita	
January . . .	7,985,600	80	555,100	68	555,600	67	1,672,000	65	815,200	47	130,860,700	101
February . . .	8,018,200	80	573,000	70	578,200	69	1,549,400	60	835,200	48	128,227,700	99
March . . .	7,487,300	75	570,800	70	519,900	62	1,530,500	59	853,300	49	122,692,000	95
April . . .	7,718,300	77	591,200	72	537,100	64	1,475,800	57	841,100	48	118,555,800	91
May . . .	7,441,000	74	597,000	73	643,700	77	1,465,300	57	863,500	49	116,628,500	90
June . . .	7,902,300	79	629,800	77	875,200	104	1,631,200	63	1,039,700	59	120,452,200	93
July . . .	8,083,800	80	674,800	82	1,152,400	137	1,866,400	72	1,318,600	74	127,541,300	98
August . . .	7,775,200	77	655,800	80	1,014,700	121	1,665,800	64	1,262,100	71	125,270,700	96
September . . .	7,759,300	77	656,700	80	888,000	102	1,744,100	66	1,061,200	60	126,360,500	97
October . . .	7,632,500	76	634,100	77	698,000	83	1,774,400	67	961,400	54	123,630,000	95
November . . .	7,582,200	75	547,400	66	786,100	93	1,687,800	64	884,600	50	121,351,300	93
December . . .	7,749,200	77	523,900	63	549,000	65	1,812,700	68	881,900	49	127,579,900	98
For the year . . .	7,760,100	77	600,900	73	731,100	87	1,657,100	63	969,000	55	124,099,700	95

TABLE No. 10. — *Chemical Examinations of Water from the Wachusett Reservoir, Clinton.* [Parts per 100,000]

Date of Collection	APPEARANCE			ODOR		RESIDUE ON EVAPORATION		AMMONIA				Chlorine	Hardness
	Turbidity	Sediment	Color	Cold	Hot	Total	Loss on Ignition	Free	ALBUMINOID				
									Total	Dissolved	Suspended		
Jan. 8	V. slight.	V. slight.	.08	V. faintly vegetable.	Faintly vegetable.	3.85	1.25	.0012	.0094	.0070	.0024	.26	1.4
Jan. 22	V. slight.	V. slight.	.11	V. faintly vegetable.	Faintly vegetable.	3.55	1.35	.0012	.0094	.0070	.0024	.25	1.0
Feb. 5	V. slight.	V. slight.	.10	Faintly vegetable.	Distinctly vegetable.	3.45	1.60	.0018	.0072	.0068	.0004	.24	1.4
Feb. 19	V. slight.	V. slight.	.10	Faintly unpl. and cucumber.	Distinctly unpl. and cucumber.	3.40	1.45	.0032	.0206	.0172	.0034	.21	1.1
Mar. 4	V. slight.	V. slight.	.12	V. faintly vegetable.	Faintly vegetable.	3.55	1.40	.0018	.0098	.0080	.0018	.24	1.4
Mar. 18	V. slight.	V. slight.	.10	V. faintly vegetable.	Faintly vegetable.	3.25	1.60	.0014	.0082	.0074	.0012	.21	1.0
Apr. 8	None.	V. slight.	.08	V. faintly vegetable.	V. faintly vegetable.	4.65	2.25	.0010	.0082	.0074	.0008	.23	1.0
Apr. 22	V. slight.	V. slight.	.12	V. faintly vegetable.	Faintly vegetable.	3.35	1.60	.0018	.0076	.0060	.0016	.23	1.3
May 6	V. slight.	V. slight.	.10	V. faintly vegetable.	Faintly vegetable.	3.75	1.45	.0006	.0080	.0070	.0010	.23	1.0
May 20	V. slight.	V. slight.	.14	Faintly vegetable.	Distinctly vegetable.	3.65	1.65	.0004	.0078	.0054	.0024	.22	0.6
June 3	V. slight.	V. slight.	.15	V. faintly vegetable.	Faintly vegetable.	4.20	1.70	.0010	.0104	.0088	.0016	.24	1.4
June 17	V. slight.	V. slight.	.12	V. faintly vegetable.	Faintly vegetable.	3.70	1.45	.0040	.0190	.0170	.0020	.23	1.1
June 30	None.	V. slight.	.14	V. faintly vegetable.	Faintly vegetable.	3.30	1.15	.0018	.0114	.0088	.0026	.24	0.8
July 24	V. slight.	V. slight.	.10	V. faintly vegetable.	Faintly vegetable.	4.15	1.80	.0034	.0130	.0110	.0020	.22	1.4
Aug. 5	V. slight.	V. slight.	.11	V. faintly vegetable.	Faintly vegetable.	3.45	1.30	.0014	.0148	.0128	.0020	.20	1.0
Aug. 19	V. slight.	V. slight.	.12	V. faintly vegetable.	Faintly vegetable.	4.00	2.00	.0050	.0176	.0118	.0058	.18	1.1
Sept. 2	V. slight.	V. slight.	.10	V. faintly vegetable.	Faintly vegetable.	3.15	1.40	.0036	.0132	.0094	.0038	.24	1.6
Sept. 23	V. slight.	V. slight.	.05	V. faintly vegetable.	Faintly vegetable.	3.70	1.45	.0044	.0106	—	—	.23	1.6
Oct. 7	V. slight.	V. slight.	.06	None.	V. faintly vegetable.	4.00	2.00	.0012	.0052	.0028	.0024	.22	1.4
Oct. 21	V. slight.	V. slight.	.05	V. faintly vegetable.	V. faintly vegetable.	4.15	1.75	.0022	.0082	.0076	.0006	.24	1.4
Nov. 4	None.	V. slight.	.05	V. faintly vegetable.	V. faintly vegetable.	3.05	0.85	.0016	.0074	.0068	.0006	.26	1.6
Nov. 19	V. slight.	V. slight.	.03	V. faintly vegetable.	Faintly vegetable.	4.35	1.70	.0026	.0092	.0074	.0018	.26	1.4
Dec. 9	V. slight.	V. slight.	.02	V. faintly vegetable.	Faintly vegetable.	4.15	1.80	.0016	.0084	.0066	.0018	.26	1.6
Dec. 23	V. slight.	V. slight.	.05	V. faintly vegetable.	Faintly vegetable.	2.75	1.30	.0012	.0080	.0058	.0022	.24	1.1
Av.	.....	.....	.09	.....	.....	3.69	1.55	.0021	.0105	.0085	.0020	.23	1.2

TABLE No. 11. — Chemical Examinations of Water from the Sudbury Reservoir. [Parts per 100,000]

Date of Collection	APPEARANCE		ODOR		RESIDUE ON EVAPORATION		AMMONIA			Chlorine	Hardness		
	Turbidity	Sediment	COLOR	Cold	Hot	Total	Loss on Ignition	Free	Total			Dissolved	Suspended
Jan. 8	V. slight.	V. slight.	.20	V. faintly unpl. cucumber.	Faintly unpl. cucumber.	3.50	1.60	.0018	.0140	.0130	.0010	.28	1.6
Feb. 6	V. slight.	V. slight.	.14	Faintly cucumber	Distinctly cucumber.	4.15	1.90	.0014	.0124	.0094	.0030	.33	1.7
Mar. 6	V. slight.	None.	.11	V. faintly vegetable.	Faintly vegetable.	3.65	1.25	.0038	.0100	.0074	.0026	.27	1.7
Apr. 11	V. slight.	V. slight.	.10	V. faintly vegetable.	V. faintly vegetable.	3.70	1.85	.0018	.0088	.0054	.0034	.28	1.1
May 6	V. slight.	V. slight.	.19	V. faintly vegetable.	Faintly vegetable.	4.40	1.80	.0006	.0098	.0080	.0018	.26	1.7
June 3	V. slight.	V. slight.	.19	V. faintly vegetable.	Faintly vegetable.	4.00	1.60	.0022	.0112	.0088	.0024	.30	1.8
July 7	V. slight.	V. slight.	.15	V. faintly vegetable.	Faintly vegetable.	5.35	2.65	.0018	.0138	.0118	.0020	.28	1.8
Aug. 6	Slight.	Slight.	.15	Faintly unpleasant.	Distinctly vegetable.	4.30	1.90	.0068	.0194	.0104	.0090	.22	1.3
Sept. 9	V. slight.	V. slight.	.10	V. faintly vegetable.	Faintly vegetable.	4.40	2.05	.0024	.0122	.0108	.0014	.27	1.6
Oct. 4	None.	V. slight.	.09	None.	V. faintly vegetable.	3.25	1.35	.0018	.0068	.0062	.0006	.24	1.6
Nov. 4	V. slight.	V. slight.	.08	Faintly vegetable.	Distinctly vegetable.	3.70	1.75	.0020	.0106	.0102	.0004	.31	1.4
Dec. 9	V. slight.	V. slight.	.04	V. faintly vegetable.	Faintly vegetable.	3.75	1.60	.0016	.0116	.0100	.0016	.28	1.7
Av.	.....	.....	.13	.....	.....	4.01	1.78	.0023	.0117	.0093	.0024	.28	1.6

TABLE No. 12. — Chemical Examinations of Water from Spot Pond, Stoneham. [Parts per 100,000]

Jan. 14	V. slight.	V. slight.	.05	V. faintly fishy.	Faintly fishy.	4.20	1.55	.0014	.0138	.0108	.0030	.31	1.3
Feb. 4	V. slight.	V. slight.	.09	V. faintly vegetable.	Faintly vegetable.	4.05	1.50	.0018	.0124	.0094	.0030	.29	1.4
Mar. 7	V. slight.	V. slight.	.05	V. faintly vegetable.	V. faintly vegetable.	4.25	1.20	.0030	.0172	.0156	.0016	.28	1.8
Apr. 12	V. slight.	V. slight.	.10	V. faintly vegetable.	Faintly vegetable.	3.75	1.30	.0006	.0110	.0086	.0024	.31	1.4
May 12	V. slight.	V. slight.	.05	V. faintly vegetable.	Faintly vegetable.	3.65	1.40	.0018	.0124	.0112	.0012	.34	1.6
June 2	V. slight.	Slight.	.02	V. faintly vegetable.	Faintly vegetable.	3.80	1.75	.0000	.0128	.0108	.0020	.31	1.7
July 7	V. slight.	V. slight.	.05	V. faintly vegetable.	Faintly vegetable.	4.10	1.55	.0014	.0162	.0140	.0022	.26	1.1
Aug. 4	V. slight.	V. slight.	.10	V. faintly vegetable.	V. faintly vegetable.	3.80	1.80	.0010	.0152	.0128	.0024	.33	1.4
Sept. 8	V. slight.	V. slight.	.05	V. faintly vegetable.	Faintly vegetable.	3.60	1.10	.0012	.0156	.0120	.0036	.30	1.8
Oct. 8	V. slight.	V. slight.	.01	V. faintly vegetable.	V. faintly vegetable.	4.65	2.30	.0004	.0136	.0082	.0054	.30	1.7
Nov. 3	V. slight.	V. slight.	.04	V. faintly vegetable.	V. faintly vegetable.	3.95	2.15	.0012	.0134	.0104	.0030	.31	1.4
Dec. 1	V. slight.	V. slight.	.03	V. faintly vegetable.	Faintly vegetable.	4.40	1.90	.0014	.0136	.0086	.0050	.31	1.6
Av.	.....	.....	.05	.....	.....	4.02	1.63	.0013	.0139	.0110	.0029	.30	1.5

TABLE No. 13. — *Chemical Examinations of Water from Lake Cochituate.* [Parts per 100,000]

Date of Collection	APPEARANCE			ODOR		RESIDUE ON EVAPO- RATION		AMMONIA				Chlorine	Hardness		
	Turbidity	Sediment	COLOR			Total	Loss on Ignition	Free	Total	ALBUMINOID					
				Dissolved	Suspended										
Jan.	9	V. slight.	Slight.	Cold	Hot	5.85	2.00	.0004	.0244	.0128	.0116	.64	2.7		
Feb.	6	V. slight.	Slight.			Faintly unpleasant and earthy.	Distinctly unpleasant and earthy.	6.80	2.20	.0012	.0208	.0128	.0080	.63	2.7
Mar.	5	V. slight.	Slight.			Faintly vegetable and earthy.	Distinctly vegetable and earthy.	6.70	2.05	.0002	.0208	.0124	.0084	.64	3.0
Apr.	9	V. slight.	Slight.			Faintly vegetable and earthy.	Distinctly vegetable and earthy.	6.80	2.20	.0018	.0158	.0110	.0048	.57	2.7
May	7	V. slight.	Cons.			Faintly vegetable and earthy.	Distinctly vegetable and earthy.	7.05	2.15	.0006	.0144	.0092	.0052	.55	3.0
June	4	V. slight.	Slight.			Faintly vegetable and earthy.	Distinctly vegetable and earthy.	7.20	2.15	.0000	.0182	.0108	.0074	.58	2.7
July	7	V. slight.	Slight.			Faintly vegetable and earthy.	Distinctly vegetable and earthy.	8.25	2.75	.0006	.0160	.0134	.0026	.68	2.7
Aug.	6	V. slight.	V. slight.			Faintly vegetable.	Distinctly vegetable.	7.55	2.40	.0004	.0212	.0148	.0064	.70	3.1
Sept.	2	V. slight.	V. slight.			Faintly vegetable and earthy.	Distinctly vegetable and earthy.	6.90	2.35	.0014	.0210	.0166	.0044	.71	2.9
Oct.	8	V. slight.	V. slight.			V. faintly vegetable.	Distinctly vegetable.	7.15	2.40	.0036	.0140	.0098	.0042	.70	3.1
Nov.	5	V. slight.	V. slight.			V. faintly vegetable.	Faintly vegetable.	7.40	2.25	.0086	.0158	.0136	.0022	.60	2.9
Dec.	10	V. slight.	V. slight.			Faintly vegetable and marshy.	Distinctly vegetable and marshy.	6.25	2.15	.0206	.0160	.0124	.0036	.66	2.7
Av.			.11			6.99	2.25	.0033	.0182	.0125	.0057	.64	2.8		

TABLE No. 14. — *Chemical Examinations of Water from a Tap at the State House, Boston.* [Parts per 100,000]

Jan.	7	V. slight.	V. slight.	V. faintly vegetable.	V. faintly vegetable.	3.65	1.60	.0006	.0100	.0092	.0008	.31	1.7
Feb.	4	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	4.80	1.75	.0012	.0104	.0092	.0012	.33	1.6
Mar.	3	V. slight.	V. slight.	V. faintly vegetable.	V. faintly vegetable.	4.65	1.40	.0030	.0136	.0106	.0030	.30	1.1
Apr.	7	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	4.15	1.45	.0006	.0092	.0076	.0016	.33	1.4
May	5	V. slight.	V. slight.	Faintly vegetable.	Distinctly vegetable.	3.95	1.15	.0010	.0090	.0078	.0012	.30	1.8
June	2	V. slight.	Slight.	V. faintly vegetable.	Faintly vegetable.	3.65	1.20	.0004	.0106	.0072	.0034	.26	1.8
July	7	V. slight.	Slight.	V. faintly vegetable.	V. faintly vegetable.	4.25	1.65	.0020	.0170	.0128	.0042	.25	1.4
Aug.	4	V. slight.	Slight.	V. faintly vegetable.	Faintly vegetable.	4.15	2.00	.0006	.0136	.0094	.0042	.25	1.1
Sept.	9	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	4.55	2.10	.0006	.0130	.0094	.0036	.22	1.7
Oct.	6	V. slight.	V. slight.	V. faintly vegetable.	V. faintly vegetable.	3.90	1.85	.0004	.0052	.0040	.0012	.25	1.6
Nov.	3	V. slight.	Slight.	V. faintly vegetable.	Faintly vegetable.	3.80	1.60	.0016	.0106	.0070	.0036	.27	1.4
Dec.	8	V. slight.	V. slight.	V. faintly vegetable.	Faintly vegetable.	3.70	1.45	.0016	.0090	.0068	.0022	.24	1.6
Av.			.12			4.10	1.60	.0011	.0109	.0084	.0025	.28	1.5

TABLE NO. 15. — *Chemical Examinations of Water from a Faucet in Boston, 1898–1924.* [Parts per 100,000]

YEAR	COLOR	RESIDUE ON EVAPORATION		AMMONIA				Chlorine	Oxygen Consumed	Hardness
	Platinum Standard	Total	Loss on Ignition	Free	ALBUMINOID					
					Total	Dissolved	Suspended			
1898	.40	4.19	1.60	.0008	.0152	.0136	.0016	.29	.44	1.4
1899	.28	3.70	1.30	.0006	.0136	.0122	.0014	.24	.35	1.1
1900	.29	3.80	1.20	.0012	.0157	.0139	.0018	.25	.38	1.3
1901	.29	4.43	1.64	.0013	.0158	.0142	.0016	.30	.42	1.7
1902	.30	3.93	1.56	.0016	.0139	.0119	.0020	.29	.40	1.3
1903	.29	3.98	1.50	.0013	.0125	.0110	.0015	.30	.39	1.5
1904	.23	3.93	1.59	.0023	.0139	.0121	.0018	.34	.37	1.5
1905	.24	3.86	1.59	.0020	.0145	.0124	.0021	.35	.35	1.4
1906	.24	3.86	1.39	.0018	.0159	.0134	.0025	.34	.36	1.3
1907	.22	3.83	1.40	.0013	.0129	.0109	.0020	.33	.32	1.3
1908	.19	3.50	1.35	.0011	.0115	.0092	.0024	.33	.26	1.2
1909	.18	3.46	1.43	.0011	.0128	.0103	.0025	.28	.25	1.3
1910	.14	3.05	1.24	.0013	.0118	.0102	.0016	.28	.22	1.1
1911	.25	4.18	1.66	.0015	.0156	.0128	.0029	.38	.33	1.4
1912	.17	3.86	1.23	.0018	.0154	.0119	.0034	.36	.29	1.7
1913	.13	3.96	1.15	.0014	.0150	.0120	.0026	.35	.26	1.5
1914	.14	4.12	1.19	.0014	.0138	.0116	.0022	.39	.25	1.4
1915	.16	3.73	1.04	.0015	.0157	.0134	.0023	.38	.25	1.4
1916	.18	4.53	1.85	.0013	.0133	.0107	.0026	.36	—	1.4
1917	.15	4.45	1.68	.0015	.0142	.0124	.0018	.33	—	1.3
1918	.18	3.89	1.45	.0019	.0154	.0128	.0026	.29	—	1.4
1919	.20	4.28	1.41	.0010	.0130	.0108	.0022	.36	—	1.5
1920	.17	4.23	1.35	.0012	.0112	.0097	.0014	.33	—	1.5
1921	.13	3.80	1.39	.0006	.0104	.0089	.0015	.25	—	1.4
1922	.16	3.98	1.55	.0011	.0097	.0080	.0017	.30	—	1.8
1923	.15	3.90	1.45	.0011	.0100	.0090	.0010	.26	—	1.5
1924	.12	4.10	1.60	.0011	.0109	.0084	.0025	.28	—	1.5

TABLE NO. 16. — *Number of Bacteria per Cubic Centimeter in Water from Various Parts of the Metropolitan Water Works, 1898–1924.* [Averages of weekly determinations]

YEAR	CHESTNUT HILL RESERVOIR			SOUTHERN SERVICE TAPS	
	Sudbury Aqueduct Terminal Chamber	Cochituate Aqueduct	Effluent Gate-house No. 2.	Low Service, 180 Boylston Street	High Service, 1 Ashburton Place
1898	207	145	111	96	—
1899	224	104	217	117	123
1900	248	113	256	188	181
1901	225	149	169	162	168
1902	203	168	121	164	246
1903	76	120	96	126	243
1904	347	172	220	176	355
1905	495	396	489	231	442
1906	231	145	246	154	261
1907	147	246	118	130	176
1908	162	138	137	136	148
1909	198	229	119	150	195
1910	216	—	180	178	213
1911	205	204	151	175	197
1912	429	450	227	249	259
1913	123	243	157	119	140
1914	288	—	252	174	220
1915	163	—	128	117	134
1916	128	—	85	102	105
1917	178	112	119	119	141
1918	1,163	168	705	317	544
1919	92	85	100	70	84
1920	148	86	108	113	112
1921	103	—	83	92	92
1922	163	—	153	160	172
1923	229	—	178	217	230
1924	137	—	96	150	160

TABLE No. 17. — Colors of Water from Various Parts of the Metropolitan Water Works in 1924. (Averages of Weekly Determinations)
[Platinum Standard]

MONTH	WACHUSETT RESERVOIR						FRAM- INGHAM RESER- VOIR No. 3	LAKE COCHITU- ATE			CHESTNUT HILL RESERVOIR			SPOT POND	FELLS RESER- VOIR	NORTHERN SERVICE		SOUTHERN SERVICE	
	Surface	Mid-depth	Bottom	Worcester Street Bridge	Quinapoxet River	Stillwater River		Surface	Mid-Depth	Bottom	Inlet (Sudbury Aqueduct)	Inlet (Cochituate Aqueduct)	Effluent Gate-house No. 2			Tap at Glenwood Yard, Medford (Low Ser- vice)	Tap at Fire Station, Hancock Street Ry- cret (High Service)	Tap at 180 Boylston Street, Boston (Low Service)	Tap at 1 Ashburton Place, Boston (High Service)
January	17	16	18	35	42	34	25	22	22	23	25		23	16	16	23	16	23	24
February	20	21	21	30	41	30	26	23	24	28	26		25	16	16	25	16	25	25
March	20	20	20	32	38	31	24	26	28	31	24		23	16	16	24	16	23	23
April	19	18	19	38	40	39	23	23	23	25	22	1	21	16	16	22	16	22	23
May	19	19	19	37	45	42	23	23	22	32	23	1	22	16	16	22	16	22	22
June	19	19	19	32	46	36	24	24	24	55	24	1	23	17	16	23	16	23	24
July	19	17	18	19	41	30	22	22	22	112	22	1	21	17	17	22	17	22	22
August	19	20	20	21	45	27	21	19	23	136	21	1	20	18	17	21	18	21	21
September	18	19	20	20	44	26	20	19	23	198	20	1	19	17	18	19	18	19	19
October	18	18	19	19	40	26	19	19	19	159	19	1	18	17	17	18	17	18	18
November	17	17	18	19	40	27	19	21	21	66	19	1	18	17	17	18	17	18	18
December	17	17	17	31	46	24	22	20	21	21	18	1	8	17	17	18	17	18	18
Mean	18	19	19	29	42	31	22	22	23	74	22	-	21	17	17	21	17	21	21

TABLE No. 18. — *Temperatures of Water from Various Parts of the Metropolitan Water Works in 1924. (Averages of Weekly Determinations)*
[The temperatures are taken at the same places and times as the samples for microscopical examination; the depth at place of observation is from high-water mark.
[Degrees Fahrenheit.]

MONTH	WACHUSETT ¹ RESERVOIR (DEPTH AT PLACE OF OBSERVATION 107 FEET)			SUDBURY ¹ RESERVOIR (DEPTH AT PLACE OF OBSERVATION 54.5 FEET)			WACHU- SETT AQUE- DUCT	FRAMINGHAM ¹ RESERVOIR No. 3 (DEPTH AT PLACE OF OBSERVATION 20.5 FEET)			LAKE COCHITUATE ¹ (DEPTH AT PLACE OF OBSERVATION 62.0 FEET)			CHEST- NUT HILL RESER- VOIR No. 2	SPOT POND ¹ (DEPTH AT PLACE OF OBSERVATION 28.0 FEET)			NORTHERN SERVICE		SOUTHERN SERVICE	
	Surface	Mid-depth	Bottom	Surface	Mid-depth	Bottom	End of Open Channel	Surface	Mid-depth	Bottom	Surface	Mid-depth	Bottom	Effluent Gate-house No. 2	Surface	Mid-depth	Bottom	Tap at Glenwood Yard, Medford (Low Service)	Tap at Fire Station Hancock Street, Ev- erett (High Service)	Tap at 180 Boylston Street, Boston (Low Service)	Tap at 1 Ashburton Place, Boston (High Service)
January	33.0	33.3	-	33.4	34.0	34.5	33.0	34.9	35.3	35.4	34.4	34.4	34.7	35.1	34.0	34.0	35.0	39.3	38.4	38.3	39.4
February	33.1	33.0	35.5	33.0	34.5	36.0	32.5	33.8	34.6	34.6	33.7	34.7	35.6	35.3	34.3	35.3	35.0	38.4	37.7	36.5	38.4
March	33.7	34.3	35.5	34.3	35.2	36.5	33.5	36.0	35.9	36.5	35.7	35.4	36.1	36.8	35.9	36.0	36.3	39.0	39.0	45.4	39.4
April	38.3	37.0	39.3	42.5	44.8	41.0	39.3	45.0	42.8	47.0	43.6	43.1	42.9	44.2	44.0	45.8	42.5	46.1	46.5	45.4	46.4
May	48.1	47.3	48.0	54.3	51.0	51.0	52.0	54.5	54.1	55.4	54.4	51.5	47.0	54.0	53.5	53.8	52.8	55.3	53.3	54.3	55.7
June	60.4	54.8	54.3	63.9	62.5	58.5	55.0	64.6	65.1	61.5	63.5	56.8	47.7	62.6	62.9	64.8	60.5	63.1	57.6	63.1	63.6
July	72.2	56.3	56.0	72.0	71.0	63.0	-	73.6	72.1	73.6	73.5	58.1	47.7	71.9	72.5	72.5	68.5	72.0	66.2	72.0	72.5
August	72.1	61.5	53.0	72.8	69.8	69.0	61.0	72.2	72.0	71.3	71.3	56.2	47.8	72.6	72.9	72.3	71.8	68.6	66.2	73.1	73.2
September	65.3	65.8	56.0	66.4	65.0	66.5	58.5	64.9	65.4	63.5	65.2	57.8	48.1	65.9	66.1	67.0	65.4	65.1	67.2	68.0	68.0
October	58.3	57.3	54.8	58.4	56.0	59.3	55.0	55.9	56.5	55.3	57.5	57.1	47.8	57.8	57.5	59.0	55.8	60.0	59.6	60.1	60.1
November	49.0	49.5	48.5	46.9	46.5	48.5	47.3	42.9	41.5	44.0	47.5	48.1	46.2	46.4	47.5	47.8	48.8	51.8	53.1	50.7	51.3
December	36.3	39.5	38.3	35.3	36.0	36.2	37.5	34.3	34.3	35.0	37.1	39.0	39.1	35.1	37.5	36.0	37.0	46.5	42.5	40.3	40.7
Mean	50.0	47.5	47.2	50.9	50.8	50.0	45.9	51.1	50.8	51.1	51.7	47.7	43.4	51.5	51.6	52.0	50.8	54.3	52.4	53.2	54.1

¹ Surface temperatures are averages of weekly determinations. Mid-depth and bottom temperatures are averages of biweekly determinations.

TABLE No. 19. — *Length of Metropolitan Water Works Main Lines and Connections and Number of Valves set in Same, Dec. 31, 1924*
 [Pipes are of cast iron unless otherwise noted]

	DIAMETER OF PIPES IN INCHES															Total	
	60	56	48	42	40	36	30	24	20	16	14	12	10	8	6		4
Total length owned and operated Dec. 31, 1923 (feet)	45,656	—	211,092	9,810	6,887	63,626	51,141	96,056	99,907	74,327	26	29,150	3,853	1,890	1,282	46	694,749
Gate valves in same	7	—	56	1	3	60	45	67	61	91	1	118	22	19	25	1	577
Air valves in same	52	—	125	5	5	47	24	53	62	38	—	10	1	—	—	—	422
Length laid or relaid during 1924 (feet)	21,101	2,830	—	—	—	80	—	—	—	74	—	6	—	—	—	—	24,091
Gate valves in same	2	—	—	—	—	1	—	—	—	5	—	1	—	—	—	—	9
Air valves in same	25	8	—	—	—	—	—	—	—	5	—	—	—	—	—	—	33
Length abandoned during 1924 (feet)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5
Gate valves in same	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Air valves in same	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Length owned and operated Dec. 31, 1924 (feet)	66,757 ¹	2,830 ²	211,092	9,810	6,887	63,706	51,141 ³	96,056	99,907	74,396	26	29,156	3,853	1,890	1,282	46	718,835 ⁴
Gate valves in same	9	—	56	1	3	61	45	67	61	96	1	119	22	19	25	1	586
Air valves in same	77	8	125	5	5	47	24	53	62	38	—	10	1	—	—	—	455

¹ Includes 2,035 feet of 76-inch concrete-lined pressure tunnel; 363 feet of 76-inch mortar-lined and concrete-covered steel pipe; 21 feet of 76-inch cast-iron pipe; 85 feet of 60-inch concrete-covered steel pipe and 19,611 feet of steel pipe.
² Steel pipe.
³ Includes 15,512 feet of 30-inch mortar-lined and covered wrought iron pipe.
⁴ 136.14 miles.

TABLE No. 20. — *Length of Metropolitan Water Works Hydrant, Blow-off and Drain Pipes, Dec. 31, 1924. [All pipes are of cast iron]*

	DIAMETER OF PIPES IN INCHES								Total
	24	20	16	12	10	8	6	4	Total
Total length in use Dec. 31, 1923 (feet)	352	292	3,154	6,904	176	545	3,985	1,569	16,977
Valves in same	—	—	32	110	2	9	96	46	295
Length laid or relaid in 1924 (feet)	—	—	237	—	—	—	63	—	300
Valves in same	—	—	7	—	—	—	1	—	8
Length abandoned in 1924 (feet)	—	—	—	—	—	—	—	—	—
Valves in same	—	—	—	—	—	—	—	—	—
Length in use Dec. 31, 1924 (feet)	352	292	3,391	6,904	176	545	4,048	1,569	17,277
Valves in same	—	—	39	110	2	9	97	46	303

13.27 miles.

TABLE No. 21 — Length of Metropolitan Water Works Main Lines and Connections and Water Pipes, Four Inches in Diameter and Larger, in the Several Cities and Towns supplied by the Metropolitan Water Works, Dec. 31, 1924

BY WHOM OWNED	INCHES												TOTALS							
	60	56	48	42	40	36	30	24	20	18	16	14	12	10	8	7	6	4	Feet	Miles
Metropolitan Water Works	66,757	2,830	211,092	9,810	6,887	63,706	51,141	96,056	99,907	—	74,396	26	29,156	3,853	1,890	—	1,282	46	718,835	136.14
Arlington	—	—	—	—	—	—	—	—	—	—	—	—	25,208	31,337	43,065	—	185,587	14,112	299,309	56.69
Belmont	—	—	—	—	—	—	—	—	—	—	—	—	8,978	23,707	35,646	—	144,095	269	212,695	40.28
Boston	—	—	10,533	15,980	16,081	43,535	93,707	79,567	86,520	—	283,056	5,041	1,548,066	441,047	890,474	—	1,139,543	89,135	4,742,285	898.16
Chelsea	—	—	—	—	—	—	—	—	—	—	5,176	—	5,479	39,826	31,902	—	147,213	6,747	236,343	44.76
Everett	—	—	—	—	—	—	—	2,484	2,900	—	5,204	5,998	8,306	44,134	27,217	—	154,764	29,190	280,197	53.07
Lexington	—	—	—	—	—	—	—	—	—	—	—	—	9,701	5,011	36,141	—	134,280	27,890	213,023	40.35
Malden	—	—	—	—	—	—	—	—	—	—	8,891	11,118	88,664	32,541	98,416	—	229,709	51,037	520,376	98.56
Medford	—	—	—	—	—	—	—	—	673	—	6,775	9,598	36,514	40,747	104,102	—	190,146	27,613	416,168	78.82
Melrose	—	—	—	—	—	—	—	—	—	—	5,223	3,024	23,097	20,903	25,731	—	164,972	53,557	296,507	56.16
Milton	—	—	—	—	—	—	—	—	—	—	103	44	23,878	20,926	59,434	—	184,272	17,659	306,316	58.01
Nahant	—	—	—	—	—	—	—	—	—	—	—	4,000	150	11,550	4,800	—	36,800	53,463	110,763	20.98
Quincy	—	—	—	—	—	—	—	—	2,679	—	23,232	—	35,884	53,324	174,368	994	407,512	89,987	787,980	149.24
Revere	—	—	—	—	—	—	—	—	—	—	10,600	5,785	30,115	29,936	45,040	—	134,008	67,274	322,758	61.13
Somerville	—	—	—	—	—	—	—	—	4,210	367	4,135	7,950	99,304	61,017	112,494	—	213,652	21,308	524,437	99.32
Stonham	—	—	—	—	—	—	—	—	—	—	—	—	7,425	1,825	5,110	—	112,551	19,679	146,590	27.76
Swampscott	—	—	—	—	—	—	—	—	—	—	—	3,721	6,714	20,103	6,593	—	100,424	8,121	145,676	27.59
Watertown	—	—	—	—	—	—	—	—	—	—	2,991	11,650	5,000	27,613	27,416	—	143,375	8,022	226,067	42.81
Winthrop	—	—	—	—	—	—	—	—	—	—	—	—	4,049	24,198	37,613	—	57,189	53,705	176,754	33.48
Total feet	66,757	2,830	221,625	25,790	22,968	107,241	144,848	178,107	196,889	367	429,782	67,955	1,995,688	933,598	1,767,452	994	3,881,374	638,814	10,683,079	—
Total miles	12.64	0.54	41.98	4.88	4.35	20.31	27.43	33.73	37.29	0.07	81.40	12.87	377.97	176.82	334.74	0.19	735.11	120.99	—	2,023.31

TABLE NO. 22. — *Number of Service Pipes, Meters, Per Cent of Services Metered, Fire Services and Fire Hydrants in the Several Cities and Towns Supplied by the Metropolitan Water Works, Dec. 31, 1924.*

CITY OR TOWN	Services	Meters	Per Cent of Services Metered	Services Used for Fire Purposes Only	Fire Hydrants
Arlington	4,304	4,304	100.00	20	598
Belmont	2,875	2,875	100.00	4	359
Boston	90,430	85,103	94.11	2,482	10,529
Chelsea	5,478	5,463	99.73	101	415
Everett	6,422	5,740	89.38	37	676
Lexington	1,715	1,715	100.00	7	267
Malden	8,440	8,395	99.47	66	646
Medford	7,891	7,891	100.00	20	789
Melrose	4,784	4,784	100.00	22	409
Milton	2,830	2,830	100.00	1	501
Nahant	954	896	93.92	2	106
Quincy	12,901	11,755	91.12	23	1,402
Revere	5,389	4,714	87.47	6	359
Somerville	14,189	13,279	93.59	60	1,279
Stoneham	1,942	1,942	100.00	—	158
Swampscott	2,217	2,217	100.00	8	237
Watertown	4,081	4,081	100.00	28	477
Winthrop	3,197	3,197	100.00	6	339
Totals	180,039	171,181	95.08	2,893	19,546

TABLE No. 23. — Elevation of the Hydraulic Grade Line, in Feet, above Boston City Base for Each Month at Stations on Metropolitan Water Works during 1924

1924 MONTH	LOW SERVICE						SOUTHERN HIGH SERVICE											
	BOSTON ENGINE HOUSE, BULFINCH STREET		ALLSTON ENGINE HOUSE, HARVARD STREET		MEDFORD, NEAR MYSTIC RESERVOIR		SOMERVILLE PUBLIC LIBRARY, HIGHLAND AVENUE		MALDEN WATER WORKS SHOP, GREEN STREET		CHELSEA COURT HOUSE		BOSTON METRO- POLITAN WATER WORKS OFFICE, 1 ASHBURTON PLACE		WATERTOWN WATER WORKS OFFICE, MAIN STREET		BELMONT WATER WORKS SHOP, WAVER- LEY STREET	
	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum
January	158	127	189	168	- 1	-	169	158	165	153	160	144	248	221	261	249	257	224
February	157	136	189	169	- 1	-	169	158	165	156	160	144	248	222	261	247	256	231
March	158	137	189	168	- 1	-	167	158	165	156	162	144	248	222	258	249	257	224
April	160	141	186	168	- 1	-	168	158	163	153	162	144	248	221	258	249	257	226
May	164	146	186	166	- 1	-	168	158	163	153	162	146	248	222	261	249	257	224
June	164	139	189	167	- 1	-	169	158	163	153	162	144	248	221	258	237	257	197
July	158	134	189	170	168	159	168	158	165	153	162	142	245	220	258	220	257	175
August	155	137	189	170	168	160	168	158	163	153	162	142	244	220	258	235	256	204
September	155	139	186	167	168	160	168	158	163	153	160	142	248	220	261	233	254	224
October	155	139	189	168	167	160	168	158	163	153	160	143	248	224	261	232	256	222
November	155	139	189	168	168	160	169	160	163	153	160	142	248	224	261	237	256	224
December	155	118	189	173	167	160	169	158	165	153	- 1	-	245	222	258	233	254	229
Averages	158	136	188	169	168	160	168	158	164	154	161	143	247	222	260	239	256	217

1 Gage out of order.

TABLE No. 23. — *Elevation of the Hydraulic Grade Line, in Feet, above Boston City Base, etc. — Concluded*

1924 MONTH	SOUTHERN HIGH SERVICE — Concluded						NORTHERN HIGH SERVICE												NORTHERN EXTRA HIGH SERVICE	
	MILTON WATER WORKS OFFICE, ADAMS STREET		FORBES HILL TOWER, QUINCY		QUINCY WATER WORKS SHOP		SOMERVILLE WATER WORKS SHOP		MALDEN CITY HALL		REVERE WATER WORKS SHOP, BROADWAY		LYNN ENGINE HOUSE, UNION SQUARE		WINTHROP TOWN HALL, HERMAN STREET		LEXINGTON TOWN HALL, MASSACHUSETTS AVENUE			
	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Maximum	Minimum			
January	248	218	246	226	239	205	268	247	269	258	267	248	263	215	198	171	439	409		
February	248	223	246	227	237	205	268	249	269	260	265	246	261	229	196	165	441	409		
March	248	223	246	227	237	205	268	247	269	260	263	244	263	229	191	168	439	421		
April	248	221	246	224	239	205	266	249	269	269	265	239	261	220	198	168	439	409		
May	248	223	246	226	237	205	266	243	269	262	260	239	259	213	196	166	437	404		
June	248	212	245	219	235	191	263	240	268	256	258	229	254	180	198	153	427	395		
July	248	207	242	213	237	161	266	236	269	256	255	206	245	171	194	148	430	334 ¹		
August	248	212	241	219	236	177	266	240	269	253	260	211	250	178	201	148	434	352 ¹		
September	246	212	241	225	235	196	268	243	269	258	265	235	254	208	199	178	430	411		
October	248	214	241	226	237	196	268	245	269	256	267	244	257	227	201	182	430	414		
November	248	223	242	229	238	196	268	246	270	257	265	244	263	220	203	182	430	414		
December	248	218	244	229	238	186	268	249	269	257	267	235	263	233	203	178	430	411		
Averages	248	217	244	224	237	194	267	245	269	258	263	235	258	210	198	167	434	399		

1 Lexington standpipe out of commission

APPENDIX No. 3.

CONTRACTS MADE AND PENDING DURING

Contracts relating to the

	1 Number of Contract	2 WORK	3 Number of Bids	AMOUNT OF BID		6 Contractor
				4 Next to Lowest	5 Lowest	
1	14 ²	Section 71, New Mystic Sewer, North Metropolitan System, in Winchester.	5	\$98,420 00	\$80,950 00 ¹	V. J. Grande, Boston
2	16 ²	Section 72, New Mystic Sewer, North Metropolitan System, in Winchester and Woburn.	12	59,608 00 ¹	51,143 80	Antony Cefalo, West Roxbury.
3	18	Section 77, Mill Brook Valley Sewer, North Metropolitan System, in Medford.	7	\$120,825 00 ¹	\$117,256 25	Anthony Baruffaldi Co., Somerville.

Contracts relating to the

1	13 ²	Uniflow engine and centrifugal pump for Ward Street Pumping Station in Roxbury.	4	\$26,396 00 ¹	\$23,320 00	Starkweather & Broadhurst, Boston.
2	17 ²	Economizer for Ward Street Pumping Station in Roxbury.	2	2,468 00	2,330 00 ¹	B. F. Sturtevant Company, Boston

¹ Contract based upon this bid.

APPENDIX NO. 3.

THE YEAR 1924 — SEWERAGE DIVISION
North Metropolitan System

7	8	9	10	
Date of Contract	Date of Completion of work	Prices of Principal Items of Contracts made in 1924	Value of Work done Dec. 31, 1924	
Aug. 2, 1923	June 5, 1924		\$82,919 82	1
Jan. 17, 1924	Aug. 4, 1924	For earth excavation and refilling in trench for 30-inch by 31-inch concrete sewer, \$11.00 per lin. ft.; for earth excavation and refilling in trench and laying of pipe for 20-inch Akron pipe sewer, \$9.00 per lin. ft.; for Portland cement brick masonry in manholes and special structures, \$40 per cu. yd.; for Portland cement concrete masonry in trench and special structures, \$14.00 per cu. yd.; for Portland cement boulder concrete masonry, \$3.00 per cu. yd.; for bank gravel refilling around pipe sewer, \$5.00 per cu. yd.; for rock excavation in trench, \$12.00 per cu. yd.	61,783 38	2
July 3, 1924	-	For earth excavation and refilling in trench for 36-inch by 42-inch concrete sewer, \$30.00 per lin. ft.; for earth excavation and refilling in trench and laying of pipe for 30-inch cast-iron pipe sewer, \$15.00 per lin. ft.; for Portland cement brick masonry in manholes and special structures, \$35.00 per cu. yd.; for Portland cement concrete masonry in trench and special structures, \$15.00 per cu. yd.; for Portland cement boulder concrete masonry, \$10.00 per cu. yd.; for rock excavation in trench, \$10.00 per cu yd.	48,435 82	3

South Metropolitan System

June 1, 1923	Sept. 11, 1924		\$26,396 00	1
March 1, 1924	April 18, 1924	For furnishing and erecting fuel economizer complete with scrapers and scraper driving mechanism, consisting of twenty sections, six wide with 9 ft. pipes, and standard sectional covers.	\$2,330 00	2

2 Contract completed.

CONTRACTS MADE AND PENDING DURING THE YEAR 1924 — SEWERAGE DIVISION
— *Concluded*

Summary of Contracts

	Value of Work done Dec. 31, 1924
North Metropolitan System, 3 contracts	\$193,139 02
South Metropolitan System, 2 contracts	28,726 00
Total of 5 contracts made and pending during the year 1924	\$221,865 02

APPENDIX NO. 4.

FINANCIAL STATEMENT PRESENTED TO THE GENERAL COURT ON
JANUARY 15, 1925

The Metropolitan District Commissioner respectfully presents the following abstract of the account of the receipts, expenditures, disbursements, assets and liabilities of the Metropolitan District Commission for the year ending November 30, 1924, together with recommendations for legislation which it deems desirable, in accordance with the provisions of Section 100 of Chapter 92 of the General Laws.

METROPOLITAN WATER WORKS

Construction

The loans authorized for expenditures under the Metropolitan Water Acts, the receipts which are added to the loan fund, the expenditures for the construction and acquisition of works, and the balance available on December 1, 1924, have been as follows:—

Loans authorized under Metropolitan Water Acts, including appropriations under St. 1920, c. 530, to provide for the reinforcement of the low-service and the northern high-service pipe lines, the construction of a reservoir in Arlington for the northern extra high service, to provide additional pumping machinery for the northern high service at Spot Pond and the southern high service at Chestnut Hill pumping stations		\$45,685,000 00
Receipt from town of Swampscott for admission to Metropolitan Water District, paid into Loan Fund (St. 1909, c. 320)		90,000 00
Receipts from the sales of property which are placed to the credit of the Metropolitan Water Loan Fund:—		
For the year ending November 30, 1924	\$2,703 45	
For the period prior to December 1, 1923	285,136 48	
		287,839 93
		\$46,062,839 93
Amount approved for payment from the Metropolitan Water Loan Fund:—		
For the year ending November 30, 1924	\$786,031 57	
For the period prior to December 1, 1923	44,093,010 49	
		44,879,042 06
Balance December 1, 1924		\$1,183,797 87

The amount of the Metropolitan Water Loan Bonds issued at the end of the fiscal year was \$44,547,000, bonds to the amount of \$1,000,000 having been issued during the year. Of the total amount issued, \$41,398,000 were sinking fund bonds, and the remainder, amounting to \$3,149,000, was issued as serial bonds.

At the end of the year the amount of outstanding bonds was \$44,125,000, as bonds issued on the serial payment plan to the amount of \$422,000 had been paid. During the fiscal year \$56,000 in serial bonds has been paid.

The Metropolitan Water Loan Sinking Fund amounted on December 1, 1924, to \$21,396,342.90, an increase during the year of \$1,117,961.04.

Maintenance

Amount appropriated for the maintenance and operation of works, for the year ending November 30, 1924	\$776,320 00	
Unexpended balance December 1, 1923, of amount appropriated for investigation, etc., of certain sources of water supply for the Metropolitan District	21,814 58	
Receipts credited to this fund for the year ending November 30, 1924	7,681 92	
		\$805,816 50
Amount approved for the maintenance and operation of works during the year ending November 30, 1924	\$753,134 49	
Deduct amount paid from appropriation for the year 1923	37,652 02	
		715,482 47
Balance December 1, 1924		\$90,334 03

Included in the foregoing balance is \$11,849.16, remaining unexpended from the amount appropriated for investigation and experimentation for filtration of certain sources of water supply from the Metropolitan District, under Item 673, Chapter 126, Acts of 1923.

The Commission has also received during the year ending November 30, 1924, \$97,435.32 from rentals, the sale of land, land products and power and from other proceeds from the operation of the Metropolitan Water Works, which, according to Section 18 of the Metropolitan Water Act, are applied by the Treasurer of the Commonwealth to the payment of interest on the Metropolitan Water Loan, to sinking fund requirements and expenses of maintenance and operation of works, in reduction of the amount to be assessed upon the Metropolitan Water District for the year.

Sums received from sales of water to municipalities not belonging to the District and to water companies, and from municipalities for admission to the District, have been as follows:—

For the period prior to December 1, 1906, distributed to the cities and towns of the District, as provided by Section 3 of the Metropolitan Water Act	\$219,865 65
For the period beginning December 1, 1906, and prior to December 1, 1923, applied to the Metropolitan Water Loan Sinking Fund, as provided by Chapter 238 of the Acts of 1907	136,267 14
For the year beginning December 1, 1923, and ending November 30, 1924, applied to the Metropolitan Water Loan Sinking Fund, as provided by said last-named act.	12,971 21
	\$369,104 00

It appears from the foregoing financial statement that on December 1, 1924, the balance remaining unexpended on account of the amount of the Metropolitan Water Loan Fund, authorized for the construction and acquisition of works, was \$1,183,797.87. This balance consists principally of the amounts remaining for the improvement of Beaver Dam Brook, the construction of a supply main from the terminal chamber of the Weston Aqueduct to a point near the old Mystic Pumping Station and additional pumping machinery for Spot Pond Pumping Station.

METROPOLITAN SEWERAGE WORKS*Construction*

The loans authorized under the various acts of the Legislature for the construction of the Metropolitan Sewerage Works, the receipts which are added to the proceeds of the loans, and the expenditures for construction, are given below, as follows:—

NORTH METROPOLITAN SYSTEM

Loans authorized for expenditures for construction under the various acts, including those for the Revere, Belmont and Malden extensions, North System enlargement and extensions, New Mystic Sewer, Deer Island outfall extension, lowering sewer siphon under Malden River, balance of appropriation under Chapter 76, Resolves of 1915, for the Reading extension, for the new Mystic sewer in Woburn and Winchester under Chapter 529, Acts of 1922 and for the construction of the Mill Brook Valley Sewer in Medford and Arlington, appropriated by Chapter 116, Acts of 1924	\$8,312,365 73	
Receipts from sales of real estate and from miscellaneous sources, which are placed to the credit of the North Metropolitan System:—		
For the year ending November 30, 1924	52 66	
For the period prior to December 1, 1923	87,513 38	
		\$8,399,931 77
Amount approved for payment from the Metropolitan Sewerage Loan Fund, North System:—		
For the year ending November 30, 1924	\$179,590 61	
For the period prior to December 1, 1923	7,606,432 42	
		7,786,023 03
Balance December 1, 1924		\$613,908 74

SOUTH METROPOLITAN SYSTEM

Loans authorized for expenditures for construction under the various acts, applied to the construction of the Charles River Valley Sewer, Neponset valley sewer, High-level sewer and extensions (including Wellesley branch) and an additional appropriation authorized by Chapter 525, Acts of 1920, for additional Ward Street station pumping plant, a new force main from the Quincy Station, a new pump and other equipment at the Quincy Station and an additional appropriation for the Wellesley extension, authorized under Chapter 529, Acts of 1922

Receipts for pumping, sales of real estate and from miscellaneous sources which are placed to the credit of the South Metropolitan System:—

\$9,992,046 27

For the year ending November 30, 1924

For the period ending December 1, 1923

24,599 61

\$10,016,645 88

Amount approved for payment from the Metropolitan Sewerage Loan Fund, South System:—

On account of the Charles River Valley Sewer

\$800,046 27

On account of the Neponset Valley Sewer

911,531 46

On account of the High-level sewer and extensions:—

For the year ending November 30, 1924

35,994 18

For the period prior to December 1, 1923

8,256,887 07

10,004,458 98

Balance December 1, 1924

\$12,186 90

The amount of the Metropolitan Sewerage Loan Bonds issued at the end of the fiscal year was \$17,641,412, no bonds having been issued during the year. Of the total amount issued, \$15,440,912 were sinking fund bonds and the remainder, amounting to \$2,200,500, was serial bonds.

At the end of the year the amount of the outstanding bonds was \$17,164,912, as bonds issued on the serial payment plan to the amount of \$61,500 had been paid during the year, \$476,500 having been paid to December 1, 1924.

Of the total amount outstanding at the end of the year, \$7,373,000 were issued for the North Metropolitan System, and \$9,791,912 for the South Metropolitan System. The Metropolitan Sewerage Loan Sinking Fund amounted on December 1, 1924, to \$7,353,533.77, of which \$4,483,533.09 was on account of the North Metropolitan System, and \$2,870,000.68 was on account of the South Metropolitan System, an increase during the year of \$601,350.14.

The net debt on December 1, 1924, was \$9,811,378.23, a decrease of \$662,850.14.

Included in the above figures for the North Metropolitan System is \$1,075,500 in serial bonds, of which \$265,500 has been paid, and \$1,125,000 for the South Metropolitan System, of which \$211,000 has been paid.

Maintenance

NORTH METROPOLITAN SYSTEM

Appropriated for the year ending November 30, 1924

\$335,200 00

Receipts from pumping and other sources, which are returned to the appropriation:—

For the year ending November 30, 1924

1,347 37

\$336,547 37

Amount approved for maintenance and operation of Metropolitan Sewerage Works, North System:—

For the year ending November 30, 1924

\$329,540 37

Deduct amount paid from appropriation for the year 1923

23,926 63

305,613 74

Balance December 1, 1924

\$30,933 63

Balance of appropriation under Item 670½, Chapter 494, Acts 1923, reappropriated by Resolve 17, Acts 1924, to cover expenses relative to additional sewers in the town of Arlington and the city of Medford

\$26,893 18

Amount approved for payment to November 30, 1924

8,554 99

Balance December 1, 1924

\$18,338 19

SOUTH METROPOLITAN SYSTEM

Appropriated for the year ending November 30, 1924

\$224,420 00

Receipts from sales of property, reimbursement and for pumping, which are returned to the appropriation:—

For the year ending November 30, 1924

848 66

\$225,268 66

Amount approved for maintenance and operation of Metropolitan Sewerage Works, South System:—

For the year ending November 30, 1924

\$204,782 60

Deduct amount paid from appropriation for the year 1923

7,527 50

197,255 10

Balance December 1, 1924

\$28,013 56

The balance of \$613,908.74 on account of construction in the North Metropolitan System consists almost entirely of the amount appropriated and remaining unexpended for constructing the Mill Brook Valley Sewer in Medford and Arlington, under Chapter 116, Acts of 1924 and the unexpended balance remaining for the completion of the New Mystic sewer and the Reading extension.

The balance of \$12,186.90 remaining unexpended on account of construction in the South Metropolitan Sewerage System consists of the amount remaining for the completion of the additions to the pumping plant at Ward Street Pumping Station, and also amounts appropriated under Chapter 529 of the Acts of 1922 for the completion of the Wellesley extension of the High-level sewer, for the construction of a new force main from the Quincy Pumping Station and also for a new pump and other equipment at the Quincy Pumping Station.

METROPOLITAN PARKS DIVISION

Construction

The loans authorized under the various acts of the Legislature for the construction of Metropolitan Parks and Boulevards, Charles River bridges, Charles River Basin, North Beacon Street Bridge, Nantasket Beach, the receipts which have been added to the loan funds, the expenditures for the acquisition of property and construction of works, and the balances available on December 1, 1924, have been as follows:—

METROPOLITAN PARKS LOAN FUND

Metropolitan Parks Loan Fund	.	.	.	.	.	.	.	.	.	.	\$9,093,043	96
Receipts added to loan before June 1, 1901	.	.	.	.	.	.	.	.	.	.	198,942	81
											<u>\$9,291,986</u>	<u>77</u>

Expenditures

For the year ending November 30, 1924	.	.	.	.	.	.	-
For the period prior to December 1, 1923	:	:	:	:	:	:	\$9,262,649 13
							<u> </u>
							9,262,649 13
							<u> </u>
Balance December 1, 1923	.	.	.	.	.	.	\$29,337 64

The amount of the Metropolitan Parks Loan Bonds issued at the end of the fiscal year was \$9,809,000, no bonds having been issued during the year. Of the total amount issued, \$9,485,000 were sinking fund bonds, and the remainder, amounting to \$324,000, was issued as serial bonds.

At the end of the year the amount of outstanding bonds was \$9,608,000, as bonds issued on the serial payment plan to the amount of \$201,000 had been paid. During the fiscal year \$19,250 in serial bonds has been paid.

The Metropolitan Parks Loan Sinking Fund amounted on December 1, 1924, to \$5,141,257.94, an increase during the year of \$255,916.95.

METROPOLITAN PARKS LOAN FUND, SERIES II.

Metropolitan Parks Loan Fund, Series II	\$9,354,000 00
Receipts from sales, etc.	29,934 16
	<hr/>
	\$9,383,934 16

Expenditures

For the year ending November 30, 1924	\$632,489 84	
For the period prior to December 1, 1923	<u>7,158,159 29</u>	7,790,649 13
Balance December 1, 1924		<u>\$1,593,285 03</u>

The amount of the Metropolitan Parks Loan, Series II Bonds issued at the end of the fiscal year was \$4,036,437.50, no bonds having been issued during the year. Of the total amount issued, \$2,567,500 were sinking fund bonds, and the remainder, amounting to \$1,468,937.50, was issued as serial bonds.

At the end of the year the amount of outstanding bonds was \$3,621,243.75, as bonds issued on the serial payment plan to the amount of \$415,193.75 had been paid. During the fiscal year \$71,493.75 in serial bonds has been paid.

The Metropolitan Parks Loan, Series II, Sinking Fund amounted on December 1, 1924, to \$1,306,035.89, an increase during the year of \$64,586.77.

CHARLES RIVER BASIN LOAN

Charles River Basin Loan	\$4,500,000 00
Receipts added to loan	9,368 91
	<u>\$4,509,368 91</u>

Expenditures

For the year ending November 30, 1924	\$60 00
For the period prior to December 1, 1925	4,472,802 22
	<u>4,472,862 22</u>
Balance December 1, 1924	\$36,506 69

The amount of the Charles River Basin Loan Bonds issued at the end of the fiscal year was \$4,500,000, no bonds having been issued during the year. Of the total amount issued, \$4,125,000 were sinking fund bonds, and the remainder, amounting to \$375,000, was issued as serial bonds.

At the end of the year the amount of outstanding bonds was \$4,378,000, as bonds issued on the serial payment plan to the amount of \$122,000 had been paid. During the fiscal year \$10,000 in serial bonds has been paid.

The Charles River Basin Loan Sinking Fund amounted on December 1, 1924, to \$1,557,130.31, an increase during the year of \$95,025.05.

CHARLES RIVER BRIDGES LOAN

Charles River Bridges Loan	\$1,825,000 00
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Expenditures

For the year ending November 30, 1924	\$247,189 21
For the period prior to December 1, 1923	80,316 39
	<u>327,505 60</u>
Balance December 1, 1924	\$1,497,494 40

NORTH BEACON STREET BRIDGE LOAN

North Beacon Street Bridge Loan	\$175,000 00
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Expenditures

For the year ending November 30, 1924	\$174,853 50
For the period prior to December 1, 1923	-
	<u>174,853 50</u>
Balance December 1, 1924	\$146 50

NANTASKET BEACH LOAN

Nantasket Beach Loan	\$705,881 50
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Expenditures

For the period prior to December 1, 1924	705,881 50
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MASSACHUSETTS AVENUE BRIDGE LOAN

Chapter 442, Acts of 1924	\$600,000 00
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Expenditures

For the year ending November 30, 1924	354,702 36
Balance December 1, 1924	<u>\$245,297 64</u>

NORTHERN TRAFFIC ROUTE LOAN

Chapter 489, Acts of 1924	\$2,400,000 00
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Expenditures

For the year ending November 30, 1924	5,023 56
Balance December 1, 1924	<u>\$2,394,976 44</u>

METROPOLITAN PARKS TRUST FUND

Receipts for year ending November 30, 1924	\$100 68
Receipts for the period prior to December 1, 1923	40,572 53
	<u>\$40,673 21</u>

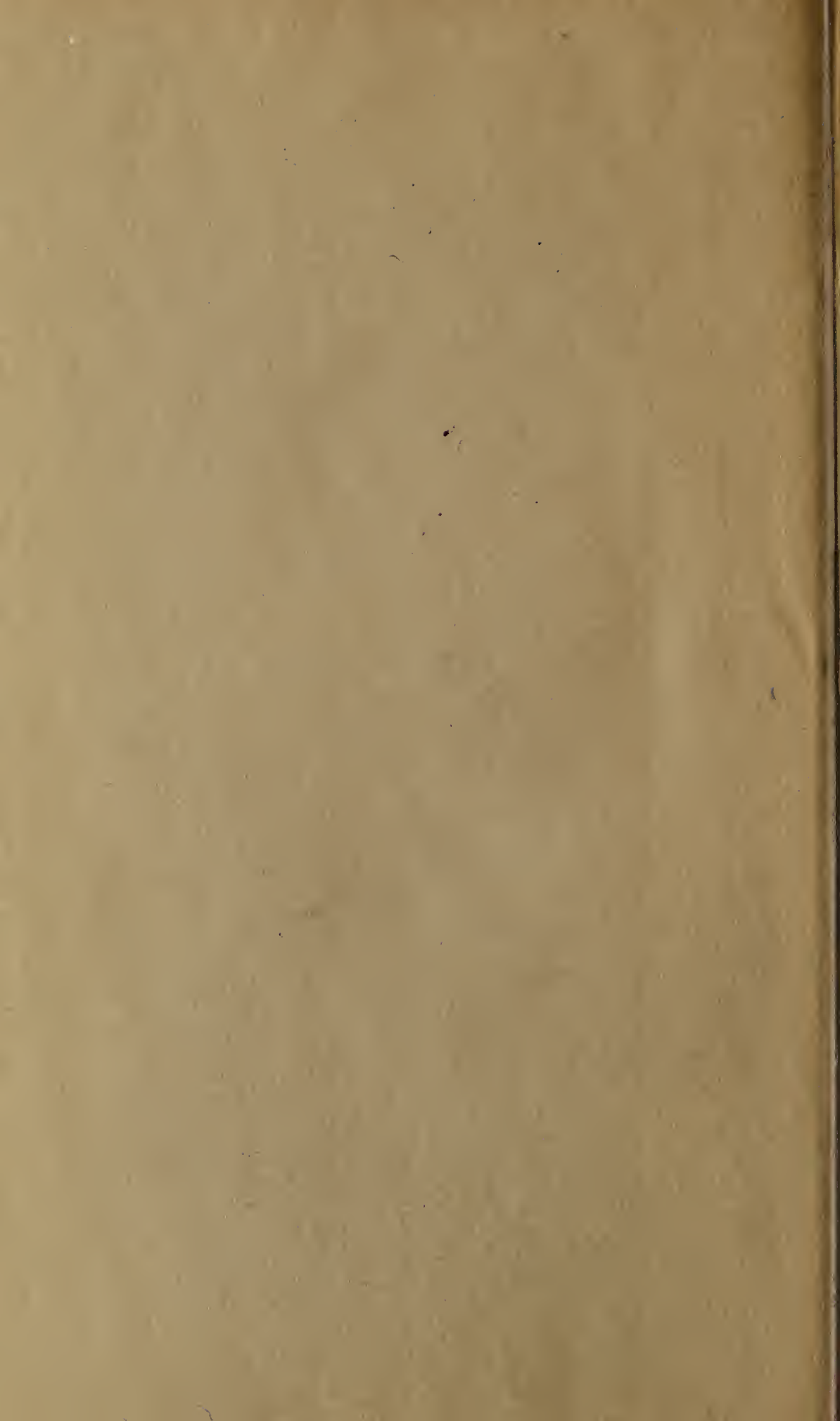
Expenditures

For the year ending November 30, 1924	-
For the period prior to December 1, 1923	\$38,106 50
	<u>38,106 50</u>
Balance December 1, 1924	\$2,566 71

Maintenance
METROPOLITAN PARKS

	Appropriation, 1924	Expended 1924	Balance December, 1, 1924
Metropolitan Parks Maintenance Fund: —			
General	\$770,394 00	\$705,901 67	\$64,492 33
Special:			
Bank Concerts	20,000 00	19,152 66	847 34
Investigation Harvard Bridge	\$25,000 00		
Expended to Dec. 1, 1923	552 57		
	24,447 43	3,038 08	21,409 35
Clearing woods	\$100,000 00		
Expended to Dec. 1, 1923	55,594 06		
	44,405 94	694 72	43,711 22
Alewife Brook Grading	2,500 00	2,481 89	18 11
Westerly Border Road, West Roxbury Parkway	40,000 00	28,129 59	11,870 41
Revere Beach Reservation:			
Eliot Circle to Revere Street	90,000 00	26,633 05	63,366 95
Electric Lighting System	50,000 00	—	50,000 00
Investigation Lynn Woods to Newburyport Turnpike	500 00	500 00	—
Nahant Beach Playground	5,000 00	2,651 28	2,348 72
Metropolitan Parks Maintenance Fund, Boulevards: —			
General	465,000 00	384,774 02	80,225 98
Special:			
Blue Hill River Road	\$75,000 00		
Expended to Dec. 1, 1923	—		
	75,000 00	—	75,000 00
Temporary repairs to Cottage Farm Bridge	\$15,000 00		
Expended to Dec. 1, 1923	6,107 47		
	8,892 53	1,769 20	7,123 33
Winthrop Parkway	\$225,000 00		
Expended to Dec. 1, 1923	219,754 85		
	5,245 15	—	5,245 15
Parkway, Stoneham and Wakefield	5,000 00	—	5,000 00
Sidewalks, Charles River Road	2,500 00	2,208 22	291 78
Roadway, Neponset River Parkway	10,000 00	8,499 37	1,500 63
Sidewalks, Blue Hills Parkway	6,000 00	1,006 88	4,993 12
Charles River Basin maintenance:			
General	189,450 00	183,781 44	5,668 56
Special:			
Repairs to locks and gates	\$17,500 00		
Expended to Dec. 1, 1923	15,714 72		
	1,785 28	1,785 28	—
Nantasket Beach maintenance	78,000 00	75,489 58	2,510 42
Wellington Bridge maintenance	15,700 00	15,150 27	549 73
Bunker Hill maintenance	10,000 00	9,732 93	267 07

METROPOLITAN PARKS EXPENSE FUND			
Receipts:			
For the year ending November 30, 1924		\$230,399 37	
For the period prior to December 1, 1923		2,405,953 16	
			\$2,636,352 53
Expenditures:			
For the year ending November 30, 1924		\$125,204 56	
For the period prior to December 1, 1923		2,203,308 15	
			2,328,512 71
Balance December 1, 1924			\$307,839 82
General Revenue			
Bunker Hill Monument: —			
Receipts:			
For the year ending November 30, 1924		\$4,518 20	
For the period prior to December 1, 1923		7,579 60	
			\$12,097 80



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